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Speech Booklet 3

Monday, February 22

For release 7:00 a.m., February 22

2:00-3:30 PRICE DISCOVERY—2000 AND BEYOND

Price Discovery Challenges in the Livestock Industry

Wayne D. Purcell, Alumni Distinguished Professor, Department of Agriculture and Applied Economics, Virginia Tech

Price Discovery Challenges in the Grain Industry

Frank Beurskens, President, Frank Beurskens Consulting, Inc

2:00-3:30 NEW APPROACHES TO DIRECT MARKETING BY FARMERS

Overview of Farm Direct Marketing Industry Trends

Monika Roth, Agricultural Marketing Extension Educator, Cornell Cooperative Extension

Farm Direct Marketing from a Producer's Perspective

Jane Eckert, Vice President, Eckert's Country Store and Farms

Direct Marketing Options: Farmers Markets, Restaurants, Community Supported Agriculture, and the Organic Alternative

Steve Gilman, President, Northeast Organic Farming Association

2:00-3:30 IMPLICATIONS OF DIETARY GUIDELINES FOR FOOD AND FARM PRODUCTION

Economics, Food Choices and Nutrition

Jim Blaylock, David Smallwood, Kathleen Kassel, Jay Variyam, Lorna Aldrich, Economic Research Service, USDA

Can U.S. Agriculture Produce the Basic Foodstuffs Consistent with the Dietary Guidelines?

Phillip C. Abbott, Professor of Agricultural Economics, Purdue University

3:45- 5:15 EMERGING MARKETS FOR FARM PRODUCTS IN 21st CENTURY NUTRITION PROGRAMS

Expanding WIC Farmers' Markets

Mike Tabor, Farmer, Licking Creek Bend Farm, Needmore, Pennsylvania

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PRICE DISCOVERY CHALLENGES IN THE LIVESTOCK INDUSTRY

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Background

The title of the session carries with it an implicit question, or perhaps that should be "questions." The rather apparent implicit question is one involving what price discovery will look like in the years beyond 2000. An arguably less apparent implied question, but one on the minds of many astute observers of the livestock industries in this country, is whether there will be any significant price discovery function as we have traditionally known it in the years beyond 2000.

Price discovery is the dynamic interaction of buyers and sellers as they seek to find or to "discover" the market-clearing price. By implication, this is a competitive process with well-informed buyers and sellers entering some type of marketplace infrastructure and executing their buy and sell objectives. In the process of that give-and-take with what is admittedly less than perfect information, a market-clearing price is being discovered. This is, of course, the process of interaction and/or negotiation that goes on at the various points of exchange along the continuum between the original livestock producer and the consumer of a finished product. Separate and independently operated profit centers are usually involved at the production, processing, transportation, and retailing levels of economic activity in a price coordinated system featuring several points of exchange.

The vast research and educational literature dealing with the livestock and meats systems in the United States has been predicated on this type of market organization or structure. There is separate ownership at the various levels of economic activity, and while these economic activities are technically related much as are the operating stations along an assembly line, they can be subjected to substantial separation or inconsistency in terms of goals, objectives, and operating norms. The literature has always ascribed to the pricing system the job of coordinating these various levels of economic activity thereby ensuring that what is offered to the final consumers will in fact be consistent with their needs and/or preferences. Price signals, premiums or discounts, are gleaned from the yes-no consumer decisions on a particular product offering by retailers, and those signals are sent back down through the complex chain of events to prompt producers to make any needed changes in the quality of their production.

The path along which those price signals are presumed to travel is, at best, a difficult communication path to follow. There is the expected profit center mentality at each level of activity. Out of profit-maximizing goals and objectives comes an operating philosophy at each level that may or may not be consistent with what would be needed to accomplish high levels of coordination between what is demanded by consumers and what is offered by producers. A myriad of governmental policies and programs has developed over time to help make this price coordinated system function, succeed, and survive. There are market regulation policies in place, antitrust statutes that presume to influence firm conduct and performance of the system, and widespread programmatic activities to facilitate the workings of the pricing system. Paramount in this latter category of facilitative policies and programs

are the government's grades and grading activities, efforts in food safety, and significant programs to collect and disseminate economic planning and/or price and market-related information.

The dual questions of how much price discovery activity will be seen and the form it will take in the years beyond 2000 may well be answered primarily by how effective current and future government programs of a facilitative nature turn out to be. This, it would appear, is the interesting and important policy-related issue as we think about, anticipate, and plan for the new millennium.

Changing Systems of Coordination

The efficacy of a price-coordinated system is going to be challenged in an increasingly complex global marketplace. As production and processing technology becomes yet more sophisticated and as new and sophisticated merchandising programs are attempted, the traditional price-based system will be a focus of attention. Whether it will be able to respond and maintain what remains of its historical position as a coordinating mechanism may well depend on what happens in our policy deliberations and decisions to change programmatic thrusts at the national level. Boehlje, *et al.* talked about 10 major changes they see in a restructuring of food, fiber, and agribusiness industries in the U.S. One of those 10 that they identified was called "integration, coordination, and partnering." The researchers summarized their thinking about the issue of control of the system as follows:

"The fundamental issue of control of the system will result in significant new linkages between food firms, farmer/producers, and input supplier with the full range of acquisitions, joint ventures, and contractual and partnering arrangements being used. In many cases, the primary motivation for this more integrated system is to provide more accurate signals to producers and input suppliers as to what the ultimate end user, the consumer, wants in his food products. Increasingly, the current spot market pricing system is not providing the detailed information consumers want on product attributes such as safety and residue-free products or consistency in quality, and other mechanisms for conveying this information are being used such as contract specifications." (Boehlje, *et al.* p. 497)

In no sector of food and fiber systems are these issues and these questions of control more apparent than in the livestock industries. Effective price discovery, it could be argued, refers to a well-informed interaction between buyers and sellers with a capacity to attach a price or a price signal to product attributes of importance to the final consumer. If the price signal type of communication system is to work and is to motivate change as needed at the producer level to keep the basic raw material aligned with the ultimate needs of the consumer, any value differences that would influence consumers yes-no vote on a product offering need to be identified and brought into the pricing process. In other words, if there is a need for quality categories one through five, then those five quality differentials have to be identified so each can have a price discovered for it as compared to an aggregate or averaging-type pricing process where those specific quality levels are not identified.

When Boehlje and his colleagues mentioned that some of the current spot or cash market pricing systems are not providing the detailed information that consumers want on issues such as consistency and quality, they likely had the livestock and meat sectors in mind. The research literature has shown a substantial variation in eating satisfaction within the Choice grade for fresh beef, for example, across the past two decades. In the 1990s, as the national trade organization in the beef industry prompted beef quality audits for both the years 1990 and 1995, it has become apparent that inconsistent quality is a major problem for the beef sector. The professional meat scientists who organized and conducted these audits are indicating that one out of five, possibly one out of four, steaks

from the Choice grade for beef is so tough as to block a reasonably satisfactory eating experience. This is a classic case of market failure and has arguably been a major contributor to the problems of declining demand that have plagued the beef industry for two decades. Analysis suggests that the demand for beef has decreased each year since 1979 or 1980 (Purcell, 1998).

Problems of a similar nature have plagued the other livestock-based meat products, specifically pork and lamb. USDA grades that were historically employed in reporting market prices did not distinguish in any significant way for final values of pork carcasses in terms of leanness and/or eating quality. As the large packer/processors started moving toward more of a merchandising mentality in their pork offerings and are into export markets, the lack of effective quality control became a major obstacle. Slaughter hogs, offering different identifiable levels of quality, especially as reflected by leanness of cuts, were not identified separately and priced by the price-based marketplace. To achieve the necessary control over quality and to avoid the merchandising problems associated with a highly variable quality of slaughter hogs coming to the marketplace, the processors have moved to control decisions on genetics, production management, rations, and health programs in their own or contract production arrangements. Once a modicum of control over quality variation was accomplished, the processors started to make important new investments in product and market development and to position themselves to brand and stand behind the quality of fresh pork offerings.

These systems in pork replace rather than complement the price-driven systems. They are an explicit recognition that the pricing system has failed and that the marketplace featuring separate profit centers at the various levels of economic activity with price to accomplish the needed level of coordination has not worked. As we move into the new millennium, we face the likely possibility that a majority of the pork produced in the United States will be produced under systems where there is an important element of control that is not price based. Whether they are vertically integrated systems where ownership of two or more stages of economic activity is involved or whether the coordination is accomplished by contract specification, these are non-price means of effecting the coordination that the processors appear to be saying they must have to accomplish their objectives.

In the beef system, the highly controversial captive supplies have been a response to the problems of variability in both quantity flows and quality of cattle. Where contracts are involved to schedule cattle through the plant, the processors can manage the stability of their operating levels and try to keep costs down. Increasingly, price grids or some set of premiums and discounts are being paid vis-à-vis some base price that is provided for in the contract. Unfortunately, the pricing grid or set of premiums and discounts being employed varies across every buyer and even within a particular buyer's program depending on projected end use for the particular set of cattle. This complicates any improvement in the level of coordination that a pricing system is able to achieve. Even when a premium or discount schedule is employed, it typically is no more refined than dividing the Choice grade into high Choice and low Choice, and the widely documented variation in eating quality within the Choice grade is still not managed effectively.

The vertical alliances that are emerging in the beef sector are another obvious attempt to get away from the problems of uncertainty that plague the price-coordinated system. For decades, beef producers who are making the breeding decisions at the farm level and choosing the genetics that will determine the nature of the beef product have agreed that there is little or no price discrimination and little or no pricing to value. There is a tendency to price on averages throughout the system from the sale of the small, weaned steer calf to the 1,200-lb slaughter steer and heifer coming out of feedyards. Indeed, in recent years that problem has arguably worsened as there is often a time window of only one to two hours during the week in which many of the cattle that are sold for that week are sold at

essentially one average price. This is not effective price discovery and is not the necessary condition for an effective price-based system of coordination.

In an alliance, the producer can receive a calculated imputed value based on contribution of calves to the ultimate success of the coordinated program. No visible pricing takes place, and there is no contribution to price discovery for the beef industry in its entirety. The alliances are, it would appear, a predictable reaction to a failed pricing system that has not been able to discover prices consistent with value, a system that has been relegated to a system characterized by aggregating across value differences and trading cattle at virtually every level on price averages. There is obviously no effective communication and no high level of pricing efficiency in a system where attributes of significant importance to the final consumer of the product are not identified and are not brought into the pricing process.

The lamb industry in the United States has experienced demand decreases that may well parallel those that can be documented for beef. The pricing system for live slaughter lambs has not only been ineffective and inefficient but has arguably been based on perverse incentives. Within acceptable weight ranges, packers have always paid higher prices for lambs with higher dressing percentages. Yet, there is a widely researched and widely established negative correlation between dressing percentage and yield grade or the measure of lean cuts as a percentage of total carcass weight. Not only was leanness, which is clearly an attribute consumers wanted to see, not being encouraged, it was actually being discouraged by the way the slaughter lambs were priced and valued. This is not, of course, an effective system that will ensure that the needs and preferences of consumers are met by what producers offer over time.

A Public Good Component

The industrialization of agriculture is increasingly widely discussed. There have been congressional attempts to regulate the marketplace as buying processors in livestock get larger relative to selling producers. Proposed legislation has ranged from dictating how buyers and sellers should transact their business to restricting the percentage of slaughter livestock that could be "captured" by any particular buyer in any particular market area. Behind these well-meaning attempts is typically an interest in maintaining the type of structure that we have historically seen in rural America. Careful perusal of a number of USDA policies ranging from payment limitations in the old farm bill programs to programs encouraging economic development, economic viability, and quality of life in rural communities suggests a bias toward an atomistic sector with independent family farms. Typically, the view of that rural community that is explicitly or implicitly called for in some of these policy measures is one where independent, often family-based, farms are functioning as entrepreneurs and providing the bulk of the important raw material as it moves into processing in our food and fiber systems. If there is to be something approaching an atomistic structure at the producer level, such that independent operating farmers and farm families can function in an entrepreneurial way and make the necessary contributions to a coordinated production and processing system, then the price discovery system must be effective. The price signals have to be transmitted, and the price incentives that show up at the producer level must be recognizable, must be attached to product attributes that the producer's decision could influence, and they must be consistent with what the consumer wants and is willing to pay for.

Those conditions will not typically be met by for-profit firms pursuing a profit-maximizing scheme at the various levels of the system. If there is a "public good" component to all this, it occurs when the public at large desires a particular end result and recognizes that the desired end result will only occur if the public is somehow involved. We would never have had, for example, a standardized set of grades for feeder cattle or for slaughter cattle unless the public in the form of the USDA, a

number of decades back, got involved and launched a grading system. Paid for by the packers but still a voluntary system, quality grades for beef cattle have been around for many years, and yield grades identifying yield of lean cuts have been with us for some 30 years or more. The last major change in the quality grades for beef goes all the way back to the 1970s when the marbling requirement to reach the Choice grade was substituted for, at least partly, by the youth of the animal. The traditionally required increasing marbling as the animal aged within A maturity was eliminated. Across the years there has been a growing, and now widespread, recognition that grades need to be modified and refined, at least to the point of bringing in a measure of tenderness, but no change has been forthcoming. The Agricultural Marketing Service of the USDA provides this public service and contributes to this widely recognized public good, but it tends to be totally reactive in terms of grading specifications and any change in the system.

The grading service is seen by the USDA as a voluntary service, one which performs functions of importance and is needed by the industry. Administrators expect to consider grading changes only when a strong request from the industry is forthcoming and preferably when there is a consensus across the industry and various industry participants with regard to the needed grading change. But this is a standard that is very difficult to meet. In the current system, all those cattle feeders who are feeding cattle of below average quality and selling them at essentially one average price are being paid too much for their cattle, often considerably too much. Conversely, those cattle feeders who are producing above-average cattle are being paid too little. Since the feedyard reflects the primary buyer of and demand for calves and feeder cattle, these same somewhat convoluted signals are passed down to producers. There is no effective price communication, and some experts would argue that quality variation in fresh beef offerings is worse in 1999 than it was 20 or even 30 years ago. Consumers who loudly proclaim they want a high-quality product, want consistency in the quality of that product and in their eating experience, and want convenience in preparation have largely been ignored. Consequently, they have moved to other meats and other sources of proteins across the years as the product failure experiences in the fresh beef market have mounted and taken a major toll.

A Look Ahead

As we approach the new millennium, the economic opportunities associated with a consumer-driven product offering are too big to be ignored. The three giant-sized packing firms in beef are all moving into value-added further processing--moves producers have hoped for since the 1970s. Large pork processors have already made moves toward coordination and control, and some of these firms are moving into pork from a background in poultry. The orientation toward new product development and quality control is what beef, pork, and lamb need, but these moves will prompt the continued demise of price-based systems. Integration and contractual arrangements will often replace price as the coordinating mechanism, testimony to the inability of the price systems to prompt the needed quality control and needed changes in what is being produced at the farm level.

Trying to anticipate the nature of price discovery for livestock beyond 2000 is not a very fruitful exercise. There *will* be price-driven systems, but they will be smaller than today and trending to even lower levels of importance. This will happen because non-price means of control and coordination will appear both more effective and easier to adapt and use.

It is much more interesting to reflect on what policy postures we will develop and, related, the extent to which the public good dimension of price discovery is recognized. Two directions are possible. First, policies and programs to facilitate effective price discovery can be developed and pursued, but this will not happen unless there is a rapid move toward recognition of the public good component of price discovery. The "market failures" in the livestock marketplace destroy the ability of

independent farmers to compete. A failure to discover price consistent with final use value pushes the livestock sectors toward integration, contracting, and other means of non-price coordination. Alliances will grow to a position of importance, especially in beef, as producers and processors look for control and the opportunity to serve an identified consumer market. This trend is in place, is powerful, and will not be denied unless there is a significant shift in public support of facilitative programs in areas like market news. In addition, the willingness of governmental agencies to get out front and be proactive in areas like grades and grading will be very important. Needed changes will not be prompted quickly by an industry pursuing profit objectives that pull in different directions.

The second alternative is to let the private initiatives run their course with little or no policy-based effort to direct them. Price discovery as we have known it will disappear quickly if this course is pursued or allowed. It will linger in beef where integration and contracting is logically more difficult but will move forward quickly in pork. And where it persists, price discovery will take a different form. Large packers will get involved, perhaps, in "discovery" of a base price for contracts and then apply a "price grid" of premiums and discounts. The same base price might be extended to all sellers, with some pricing to value being accomplished via the grids. This is not the traditional price discovery, but whatever form it takes in an industrialized livestock sector, it will be in the presence of other and non-priced means of coordination.

There is still time for some public choice, some control, over the direction the livestock sectors take. A healthy research-based dialogue is needed if the choice of directions is not to be made by neglect and default.

References

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PRICE DISCOVERY CHALLENGES IN THE GRAIN INDUSTRY

PRICE DISCOVERY 2000 AND BEYOND

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Abstract

Traditional commodity markets no longer transfer enough information between the producer, processor, and end-user to ensure that grain and oilseed content is aligned with end-use applications. Unless all mutually advantageous bargains are transacted, markets fail. Our present market coordinated structure needs to respond to a shift from trading containers to trading content.

Organizational structures emerge in response to economic opportunity. The world has changed with an explosion of such information technologies as genomics, bioinformatics, precision measurement and the Internet. Price discovery and risk transfer, the foundation of market exchange, are being replaced by value discovery, and information transfer.

The creation of new relationship based organizations along with inputs from biotechnology and information technologies results in a dynamic, responsive and balanced agricultural system capable of meeting consumer food demands for the 21st century.

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*Shape clay into a vessel
It is the space within that makes it useful. Lao-tzu 400 B.C.*

The ancient Chinese philosopher Lao-tzu recognized the usefulness of the space within a container. The container's content contributes to its usefulness. A soybean seed is a container. Value lies within the seed, a unique combination of protein and oil and amino and fatty acids. Soy protein contains, for example, varying quantities of isoflavones that decrease cholesterol and reduce certain cancers. Soy oil consists of several fatty acids appropriate for human and industrial use. Low linolenic oils are healthy for humans. High linolenic oils are best utilized as industrial solvents.

Traditional commodity markets no longer transfer enough information between the producer, processor and end-user to ensure that grain and oilseed content is matched to end-use applications. Unless all mutually advantageous bargains are transacted, markets fail (Hayek 1945). Our present market coordinated structure needs to respond to the shift from trading containers to trading content.

Traditional Market Coordination

Regulated commodity exchanges are like hub and spoke networks. The hub represents a closed circle of member owners. Membership entails access rights to the trading floor where trades take place in open outcry. Physical presence is necessary to capture full advantage of exclusive information flow resulting from buy and sell orders entering the trading pit. The spokes represent registered firms, which are either exchange members or firms associated with exchange members for purposes of access. Non members are prohibited from floor access but do have order access for placing buy/sell orders with members. The rim surrounding the spokes represents the introducing brokers and associated persons registered to solicit orders from the public. The exchange's hub and spoke network collects price information, aggregates it on the trading floor, and distributes the results in the form of a single price.

Traditional commodity markets trade a homogenous product that meets standardized minimum quality factors for delivery to a specific location on a specific date. Financial exchange is facilitated through a clearing organization, which acts as a buyer for every seller and a seller to every buyer. Buyers and sellers transfer price risk through anonymous exchange. This structure encourages trading between anonymous buyers and sellers, thereby reducing search and discovery costs for all participants. The clearing organization guarantees financial performance which eliminates the need for personal contact. The result is an efficient and economical mechanism for commodity allocation.

Producers operate in a near perfect competitive market characterized by many buyers and sellers, a homogenous product, equal access to production technologies, and ease of entry/exit. Minimal returns are the result of perfect competition (Saxowsky and Duncan 1998). Producers are unable to differentiate their commodity production, which leaves cost reduction as the primary strategy for enhancing

profitability. Successful producers reinvest gains in additional land which escalate expenses and further drives the need to expand their land base. Absent government support, efficient producers expand commodity production and inefficient producers are unable to compete.

Producers face three alternatives in order to avoid the lack of profitability associated with perfect competition: expand farm size, as mentioned above; form horizontal alliances with other producers; and/or enter vertical alliances with commercial food, marketing, and processing companies.

Commodity markets are one of many alternative coordination mechanisms. Peterson and Wysocki (1997) and Mahoney (1992) describe a coordination continuum ranging from spot markets at one extreme to vertical integration at the other (Figure #1). Spot markets achieve efficiency through arbitrage. Homogenous, substitutable commodities are allocated spatially and temporally based only on price. Relationship and trust are secondary. Information feedback is restricted to price premiums or discounts based on standardized quality terms. Spot markets trade containers.

Vertical integration is on the opposite end of the coordination continuum. Vertical integration substitutes the use of external contracts or price with internal information transfer. Vertical markets achieve efficiency through lower transaction costs including negotiation and enforcement, price advantage, and improved information flows. (Mahoney 1992) Vertically integrated firms involved in production, processing and distribution capture the full benefit of improved seed content.

Legal contracts, mutual agreements and cooperation fall at the mid-point of the coordination continuum between spot markets and vertical integration. All three structures require a personal relationship. A buyer must know the seller and the producer must know the consumer if they are to negotiate an agreement. Unlike spot markets, which rely on anonymity, relationship based structures require personal interaction, open information flow, and mutual understanding of each other's requirements. These personal alliances are plausible agricultural organizations for the future.

Market Coordination in Agriculture - Alliances for the Future

Relationship based structures, such as production alliances, increase coordination efficiency by reducing the number of sellers. For example, How does a tofu manufacturer in Japan interested in purchasing a specific soybean variety locate a producer in Illinois? How does a producer determine optimum genetics in order to provide the best quality soybean for the tofu manufacturer? What is the best logistic method for shipping a plant to Japan? Producers need to consider organizing alliances in order to pool financial resources, employ marketing expertise, and utilize production capacity to meet end-user volume requirements.

Some producers and corporations are responding quickly to new opportunities emerging in the food industry by forming alliances. Alliances are formal or informal groups of individuals or firms organized around a common purpose for sharing information, transferring knowledge, and targeting resources for member benefit. Alliances effectively reduce the number of individual buyers and sellers in the marketplace, which makes it easier to align and coordinate the food system. The following organizations are examples of such alliances.

The Soybean Producer's Information Guild¹ is a pilot project jointly funded by the Illinois and Iowa Soybean Operating Boards. The project seeks to identify both market opportunities and barriers present in the current soybean industry. The Guild is comprised of soybean producers and focuses on developing relationships between members and end-users.

Guild representatives market member's assets for the benefit of the membership. Differentiated commodities create new opportunities for those who seek to capitalize on its unrealized value. For example, biotechnology unlocks embedded information in raw commodities that differentiates previously indistinguishable commodities. Producers interested in capitalizing upon the profitability in differentiated

¹ Related information available at <http://www.agribiz.com/IQS>

markets need to organize and develop a market that defines differentiated value. But most individual producers do not have the time, resources, or contacts to develop differentiated market opportunities. The Guild project organizes interested producers into a formal structure designed to identify end-users, market the groups capabilities and capacities, collect and aggregate information, and access experts for economic, agronomic and marketing analysis.

The Keamey Area Ag Producers Alliance (KAAPA) is a farmer-direct source for premium, value enhanced grains. KAAPA farmer members form a producer cooperative to efficiently market capabilities for specific end-user clients. Their goal is to establish a labeled or branded product known for its quality and specific traits. The alliance provides members with research services such as variety evaluation plots and bin sampling for attribute analysis. KAAPA is committed to developing a system that provides long-term profitability and decreases annual risk for its producer members and clients.

Optimum Quality Grains,² L.L.C is a corporate sector marketing alliance. Optimum, a joint venture of the Dupont Company and Pioneer Hi-Bred International, Inc., leads the way in providing technology and building partnerships for the value-enhanced grain system of the future. Their vision for agriculture is not to produce more grain, but to produce grain with more value. This subtle but crucial difference reflects the shift from mass production to an end-user value focus.

Consolidated Grain and Barge Company³ (CGB) is a corporate effort interested in building alliances. CGB, operating 60 plus grain elevators located on the Mississippi, Illinois and Ohio Rivers, purchases grain directly from thousands of producers. CGB's Premium Grains program is based on building and improving relationships with growers and end-users of value enhanced grains. Their focus is based on the belief that success enables both spectrums of the food chain, producer and end-user, to succeed.

E-MARKETS⁴ and Precision Foods, Inc. focus attention on information technologies that build marketing alliances. E-MARKETS is an information technology based company that directs creation of virtual coordination tools linking end-users, seed and life science companies, processors, grain warehouses, and producers. Virtual contracting tools, such as the OSCAR Contracting System,⁵ enable users to search for contracting opportunities, provide transparency for available acreage and premiums offered by participating elevators, and enter directly into production contracts.

Precision Foods' Inc.'s INTEGRONTM Analytical System⁶ provides the seed, grain and feed industry with real time information needed to convert commodity grain into nutritional products. Near Infrared Spectroscopy delivers precise, accurate, constituent values for seed, grain and feed ingredients. Calculating actual values, rather than book values, gives feed formulators the opportunity to increase the nutritional value contained in feed grain. Ration formulation adjustments use actual constituent values to reduce feed cost, increase animal performance, and enhance grain value.

Capturing Embedded Value in the Food System

The traditional market coordinated system provides price discovery for commodity grains and oilseeds. Price reflects container value based on standardized grades, which serve as proxy for quality. Federal grain standards reflect end-use requirements, but fail to recognize information embedded in the grain. Grain standards measure the container but not the content. But price is not synonymous with value. Price reflects cost while value represents return. Value exists at three levels: value embedded in seed content, value embedded in attribute consistency, and value embedded in information flows.

There are two strategies to extract value embedded in seed content: alter the seed content through biotechnology, and/or segregate commodity grain based on compositional value. Biotechnology rapidly

² <http://www.oqg.com/>

³ <http://www.oqg.com/>

⁴ <http://www.e-markets.com/>

⁵ <http://oscar.e-markets.com/>

⁶ <http://www.integrosystem.com/>

transforms agriculture from trading undifferentiated commodities to trading commodities based on consumer valued attributes such as extractable starch or metabolizable energy. Plant biotechnology selects certain plant traits in order to develop new plant varieties. Gene stacking is the insertion of more than one agronomic or quality genetic trait to an organism (Coon, 1998). These traits are accorded value which include enhanced nutritional, environmental, quality, and metabolic modifiers (Reasons, 1999).

Segregating commodity grain based on composition increases end-user value. Commodities possess significant attribute variability (figure #3). Animals consume corn for energy. Feed formulators assume all corn has the same calorie content. What happens when actual corn energy levels vary from the formulation level? What is the cost of wasted energy? The value of consistently higher quality corn to a wet miller is approximately \$0.15 - \$0.20 per bushel, due to increased process efficiency and better capital utilization. Processors may ultimately purchase attribute specific corn to protect themselves from the diversity of corn in the market channel (Eckhoff, 1995). Attribute specific production is the selection of varieties based on compositional factors designed to enhance, eliminate or expand specific traits beneficial to an end-user.

Another opportunity associated with grain segregation is expressed in the attached graph (figures #4 and #5). Variability is present in this small sampling of commonly produced soybean varieties.⁷ How does our present marketplace distinguish between healthy and unhealthy oils within the traditional commodity flows? Our present market coordinated system ignores content variability. Potential end-use value goes unrecognized. Producers select varieties without regard to value since no feedback exists in a market coordinated system other than price.

Attribute consistency results when variety selection at the producer level is harmonized with processor or end-user requirements. Consistency can also result from improved attribute segregation at the grain warehousing level. Grain warehouses can precisely measure grain at the dump pit, allowing operators to direct grain flow based on differentiated composition. Feedmills utilize precision measurement that match formulation with actual attribute levels rather than relying on book estimates. Consistent feed formulation results in consistent feed conversion, which produces enhanced quality for the consumer.

In order to capture added value from specific traits, value has to be measured. What is measured is rewarded. The traditional commodity market depends on the 1916 United States Grain Standards Act for communicating end-use product quality. Grade standards for corn include minimum test weight per bushel, heat-damaged and total damaged kernels, and broken corn and foreign materials. These physical factors serve as proxy for content quality. But grain quality determination today utilizes sophisticated technologies such as Near Infrared Spectroscopy capable of measuring compositional content including amino acid percentages, fatty acid composition, storage proteins, extractable starch, and metabolizable energy. Animals consume corn for energy and soybeans for amino acid. Value is therefore based on energy content, not broken kernels or test weight.

Attribute specific production provides processor, feeder, and food manufacturer with customized inputs matched to specific product traits and quality. Attribute variability across seed genetics is significant as evidenced in Figures #3, 4 and 5. Aligning input specifications with desired output, results in the potential for new product development, differentiation, and ultimately increased consumer value. Increased consumer value can then flow back through the food system, providing incentives at all levels to further refine and improve the process.

The third source of value is embedded in information flows. OSCAR, a virtual contracting tool utilized by OPTIMUM Quality Grains LLC, capitalizes on embedded information flows resulting from the contracting relationship. When a producer contracts for attribute specific production through OSCAR, an agreement is created for the producer, the participating grain warehouse, and OPTIMUM. Notification is forwarded electronically to the producer's local seed and crop protection salesperson. One transaction serves as a

⁷ The Illinois and Iowa Soybean Boards provided project funding to measure several hundred, soybean varieties planted on test plots operated by the University of Illinois Department of Crop Sciences (<http://w3.aces.uiuc.edu/CropSci/>). Illinois Crop Improvement provided NIR analysis.

catalyst for multiple information transfers. Future applications might include transaction-generated linkages, which trigger financing activities, transportation requests, risk management orders, or targeted sales promotions.

Producers employing virtual contracting services might appear on preferred customer databases that provide interested end-users quick access to experienced growers. Information embedded in transactions can lower search and discovery costs, improve planning and forecasting, lower transportation costs, and reduce inventory requirements.

Conclusions

Different organizational structures emerge in response to economic changes. For example, the poultry and pork industries migrated towards vertical integration in response to consumer demands for safe, consistent, and low cost products. Vertical relationships convey consumer preferences across the entire food chain. Row crop agriculture will gravitate towards vertical forms of control unless producers are able to integrate new technologies and form new relationships.

The world has changed with the explosion of such information technologies as genomics, bioinformatics, precision measurement, and the Internet. Price discovery and risk transfer, the foundation of market exchange, are being replaced by value discovery and information transfer.

The creation of new relationship based organizations such as horizontal alliances combined with investments in biotechnology and information technology results in a dynamic, responsive and balanced agricultural system capable of meeting consumer food demands for the 21st century.

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Figure #1
Coordination Alternatives

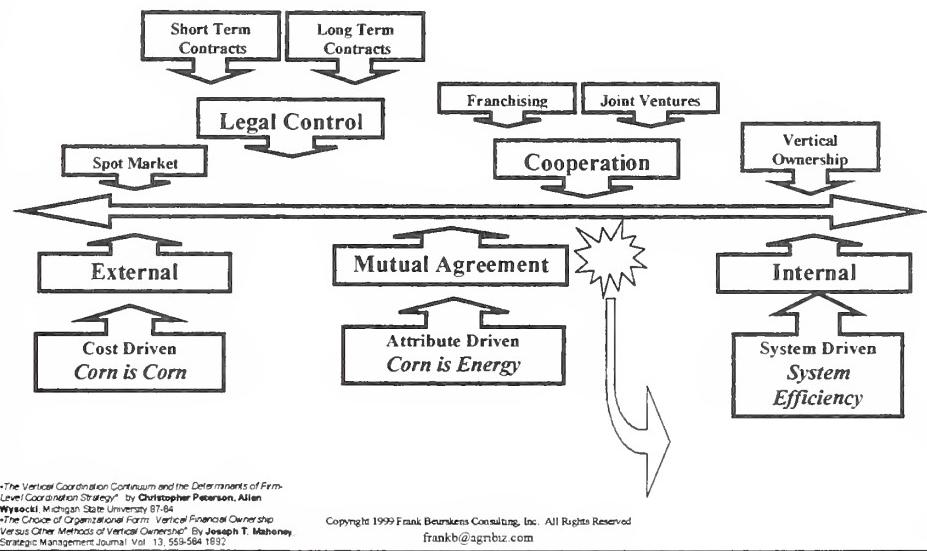


Figure # 2
Attribute Specific Hybrids

Reduce Substitutability
Iowa Grain Quality Initiative
Quality factors important to corn end uses

Factor	Average Iowa Value Long-term	Importance ^a by End-Use			
		Feed	Wet Milling	Dry Milling	Alkaline Cook
Protein (%)	8.0	++	-	+	+
Oil (%)	3.6	++	++	-	-
Starch (%)	60.0	x	+ ^b	x	x
Density (g/cc)	1.260	+	-	++	+
Test Weight (lbs./bu.)	56	+	+ ^c	++	+
Thins (%)	40	x	x	++	x
Thousand Grain Weight (g)	350	x	x	+	x

Basis 15% moisture

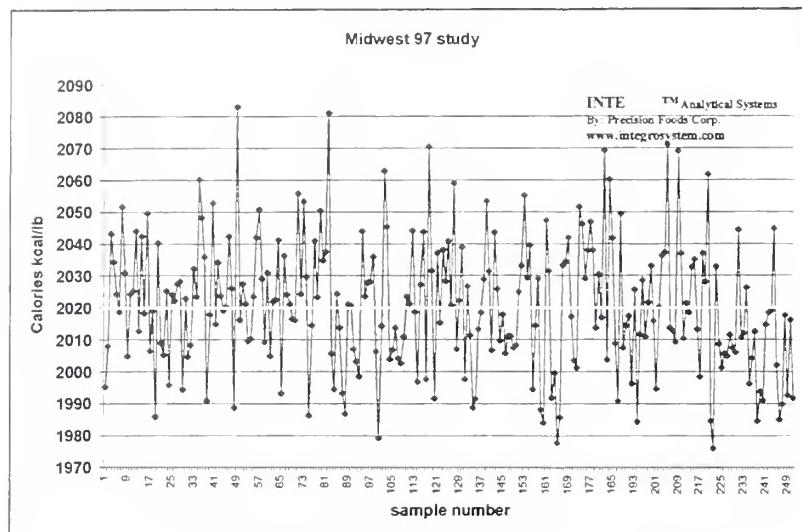
^a + = important to be higher; ++ = very important to be higher; - = important to be lower; -- = very important to be lower; x = not a major consideration

^b If extractable. Harder corn may have high starch, but may be relatively unextractable.

^c Up to 55.57 lb/bu. Very high test weight is indicative of hard corn, which is difficult to wet mill.

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Figure # 3
Energy Variability in Commodity Grain



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Figure # 4
Soy Oil - Palmitic / Stearic Acid

Off the Shelf Choice - Where is the feedback system?

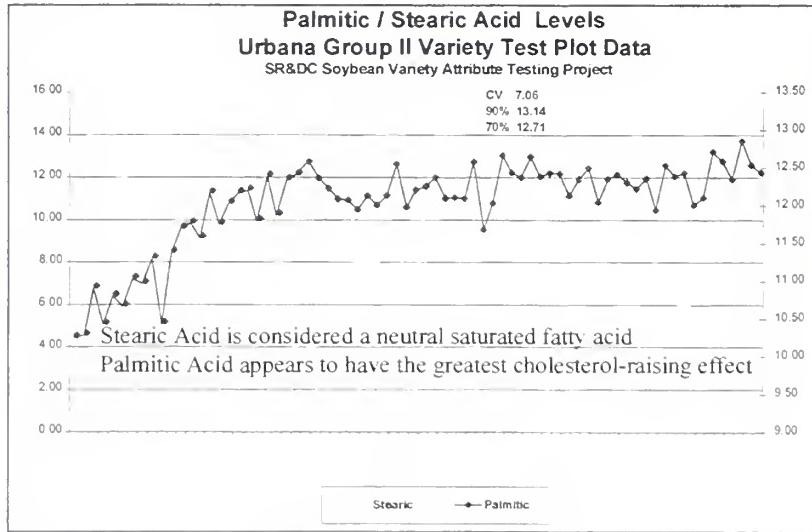
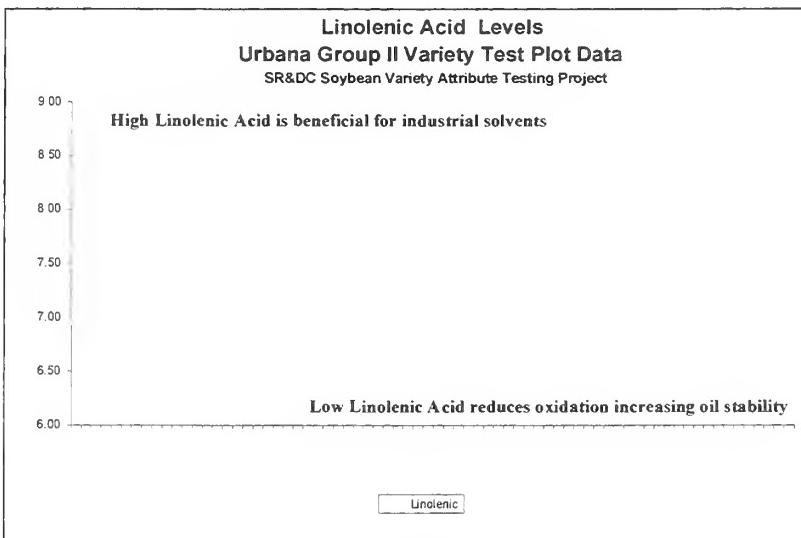


Figure #5 Linolenic Acid



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OVERVIEW OF FARM DIRECT MARKETING INDUSTRY TRENDS

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Background

During the early part of this century, the US food production and distribution system was more regionally self-sufficient. After the second World War, production and distribution shifted from a regional to a national/global system. Improved transportation afforded buyers the opportunity to source supplies nationally becoming less dependent on local supplies from farms at terminal markets. Supermarket chains began coordinating purchases through a central warehouse. Consequently small producers unable to meet price, volume and delivery requirements, either went out of business or turned to direct marketing as a means of diversifying income and capturing a share of the consumer dollar.

In response, pick-your-own operations and farm stands emerged in the late 50's and early 60's. In Massachusetts, farm marketers surveyed a year ago had an average tenure of 40 years in direct marketing. While it has the longest tenure in the northeast, farm direct marketing can now be found in every state.

Farmers' markets in the USA have a similar history only their rebirth began a decade later in the 1970's. The central marketplace at the heart of cities at the turn of the century, nearly disappeared with the advent of supermarkets and suburbs. According to USDA-AMS, there were fewer than 100 farmers' markets two decades ago, compared to 2,675 farmers' markets nationwide today.

The need for alternate marketing channels for farm goods, along with economic and social forces contributed to the rebirth of direct marketing in the 60's and 70's. Increasing gasoline and food prices made shopping at a farmers' market, farm stands or pick-your-own farms more economical for consumers. Consumers dissatisfied with picked-for-transit produce in supermarkets turned to local farms for in-season fresh quality. Concurrently, the back-to-the-land movement in the late 60's and early 70's produced a new generation of farmers who followed organic practices, and consumers who wanted healthy foods less dependent upon fossil fuel for production and transport.

Producer motivation to retain a greater share of the consumer dollar and to earn an equitable wage that affords them the opportunity to stay in farming has not changed since the 1960's. What has changed in the last 40 years is the portion of the consumer dollar being captured. Expenditures for food consumed at home have increased less than 1% annually since 1970, while expenditures on travel and recreation have increased 5.5% per year. Farm direct marketers have moved from capturing a greater share of the consumer food dollar, to cashing in on entertainment dollars. Consumers have moved from a price/product orientation to a value/experience orientation. To remain viable, savvy farm direct marketers have changed in response to changing consumer interests and lifestyle.

What the Numbers Do/Don't Tell

By the 1970's, direct farm marketing via farm stands, pick-your-own farms, and farmers' markets was well established. In New York, during the 10 year period from 1974 to 1984, farm stands grew at a rate of 5%, while pick-your-own farms grew by 110% and farmers' markets by 378% (based on a survey of extension agents). Farm stands grew less rapidly because of overhead costs associated with moving into a building and staffing it.

Beyond growing in number, established farm market businesses expanded through product diversification and season extension. Unfortunately growth and expansion of direct marketing is poorly quantified. The agricultural census provides data on the value of agricultural products sold to individuals for human consumption. In the period of 1982 to 1992, census data revealed a 40% decrease in numbers of farms selling direct to consumers and the value of products sold decreased by 20%. While there was some fallout of PYO farms in the mid- to late-80's, that data seems contrary to observations of direct marketing experts.

In comparing Agricultural Census data with state surveys of farm direct marketers, significant discrepancies are revealed. A 1987 survey of New York farmers identified 6,125 farms with direct sales valued at \$112 million (NYS Dept. of Agriculture and Markets). In contrast, the 1992 Agriculture Census for New York identified only 3,453 farms with sales of \$32 million. There are now over 15,000 New York farm direct market enterprises. The number of US direct market farms reported in the 1992 Agricultural Census was 86,432 only 24,000 more than were reported in 1978 by Henderson & Linstrom in six mid-west states. The lack of credible and accurate data makes it impossible to talk about trends in farm direct marketing in measurable terms.

The significance of direct marketing in contributing to net farm income is poorly documented. Average sales per New York direct market farm reported in the census was \$4,675, while in the 1987 survey New York farm markets it was \$18,328. A survey of 409 New Jersey farm markets (1993) reported average gross sales of \$221,000 with a total value of \$189 million. The 1992 Census reported only \$11.5 million in total sales from 1,508 New Jersey farms with an average of \$7,400 per farm. The value of all farm products sold for human consumption as reported in the 1992 Agricultural Census was \$404 million.

The significance of farmer-to-consumer direct marketing relative to other agricultural activity varies from state to state. According to extension specialists in Massachusetts and New Hampshire, between 70-90% of local produce moves into direct channels. In New York, 15% of farmers were engaged in direct marketing though the value of direct sales was only 4.4% of total ag sales (1987). For the nation, 4.5% of US farms sold products direct to consumers, representing only .2% of US agricultural sales (1992 Census of Agriculture).

One finding common to the Census of Agriculture and other surveys, is that direct marketing includes hobby farms, part-time farms and full-time farm market businesses. The Henderson & Linstrom (1978) study found 76% of farms had sales under \$20,000. In New Jersey (1993), 67% of farm markets had sales under \$100,000 (5% over \$500,000). In a 1996 survey of Pennsylvania direct marketers, 63% had sales under \$50,000 (9% over \$250,000) (PA Dept. of Agriculture). The lack of consistency in data collection does not produce directly comparable results.

Evolution of Direct Marketing: from farm stands to entertainment farming

Farm marketers today are as diverse as the products they sell and the methods by which they market their products and services to the customer. You will find successful year-round produce businesses, that offer a full line of high quality produce (of which they grow only part) to consumers in affluent suburbs. Seasonal business base success on drawing in lots of customers with attractions and niche marketers have found success in catering to special interests such as herbs. Many farm marketers offer mail order and gift basket services and are venturing into on-line promotion and sales.

Products sold at farm markets and their contribution to sales have changed significantly in the last 30 years. In season fruit crops, tomatoes and sweet corn are mainstays, but bedding plants and pumpkins extend the season and increase the bottom line. For many farm marketers, produce is a less significant part of sales while added revenue comes from added-value products and enterprises like bakeries, delis, and full-scale restaurants.

Diversification of farm markets into entertainment includes harvest festivals, company picnics, Halloween attractions, school tours and gift shops. It is not uncommon to find over 20,000 people attending a farm harvest festival or find bus loads of school children at farms in fall. Farm markets have become a destination for families and tourists, including motorcoach travelers. Farm and ranch vacations and farm B&B's are another successful marketing strategy. Tourism industry experts say agri-tourism attractions are in demand by travelers.

Evolution of Direct Marketing: from card table to haute cuisine restaurants

Since their rebirth, farmers' markets have provided a venue for innovation in farm and food products. What began with in season vegetables and fruits has evolved to as many as 700 farm grown products available to consumers year-round (as is the case at Greenmarkets in New York City). Products include specialty cheeses, meat, poultry and fish, jams, honey, wine, plants, flowers and Christmas trees, hydroponically grown tomatoes and herbs—the list goes on. Side-by-side competition, the need to find a niche in the weekly market line up, and face-to-face customer interaction spurred agricultural innovation and produced an exciting, colorful, social, alternative shopping environment. Enhancements such as music, demonstrations, and events further entertain customers.

Farmers' markets have taken direct marketing in another direction. Farmers' markets are a common outlet for organic products. Added-value processing, sales to restaurants and specialty food stores, and special orders are significant spin-off enterprises emerging from farmers' markets.

Some farmers utilize markets as their primary sales channel, while others use a combination of direct sales channels. In locations where several markets operate per week, farmers may earn all of their income at farmers' market. Surveys of market vendors reveal seasonal sales from \$1,000 to \$100,000 or more; \$10,000 to \$15,000 is typical. In a 1996 USDA-AMS survey of farmers' markets, average vendor sales per season were estimated at \$6,229. A 1997 survey of Ithaca Farmers' Market vendors revealed average sales of \$11,500 per season. Total sales at US Farmers' Markets are estimated at 1.1 billion dollars. Fortunately, due to the efforts of USDA-AMS in recent years, there is less of a data problem with farmers' markets relative to other direct marketing channels.

Recent Evolution

Consumer interest in rekindling the bond between food and farming has produced a new direct marketing partnership—the CSA farm. Subscription farming engages consumers in sharing the risks, and sometimes work, with farmers. Producers provide a weekly food supply for which consumers pay at the beginning of the season instead of at the end. A successful CSA farm may provide food for 50-100 families on 2-5 acres. CSA farms are often organic, which adds value for consumers who want assurance that food is produced in a sustainable and humane way.

Pulled by demand, farm direct marketed goods are moving back up the marketing chain into restaurants, specialty food stores, natural food retailers, consumer and producer cooperatives. Even supermarkets, capitalizing on the success of farm direct marketing, are encouraging store door delivery of local produce. A New York chain who trains its produce managers to buy local, says “no farm is too small”. By featuring local farm products, supermarkets are meeting the needs of segment of the consumer market—those interested in supporting local farms, buying local, and who perceive local to be fresher. For farmers it offers another channel for their products though price is often compromised. Have we come full circle?

Success in selling produce, plants and pumpkins has caught the attention of other farm and food producers interested in a piece of the action. Increasingly dairy, poultry and meat products are finding their way into direct channels but not without significant regulatory requirements and added cost. Goat and sheep cheeses, fluid milk, pastured poultry, pork, beef, and fish, emu and ostrich, and farm-raised deer can be found at farmers' markets and are following a similar trail through to restaurants and specialty food stores.

Benefits

The benefits of direct farm marketing accrue to producers, consumers, communities, the environment and our national food system. Producers enjoy higher returns that have allowed them to stay in farming. Because it is initially less capital intensive, farm direct marketing provides opportunities for new farmers and smaller-scale producers with limited resources. Direct marketing gives farmers the opportunity to respond to consumer needs, test new products and services, explore niche markets, and measure consumer response.

Having access to a variety of high quality, fresh, locally raised farm products is of increasing importance to consumers whether gourmet cook or low income mother trying to meet the family's nutritional needs. Consumers enjoy being able to visit a farm and interact with a real farmer. In light of growing food safety concerns, knowing where food comes from gives consumers greater confidence in the food supply.

Community impacts from direct marketing are significant. Direct market farms at the urban fringe, keep land in agriculture, make productive use of land, add to the economic diversity of the community, provide significant employment, support local businesses, utilize local resources and add to the tourism base in communities. A diversity of agricultural enterprises reduces economic risks to communities from the loss of farming.

Farmers' markets offer unique economic and social benefits. They are proven business incubators where businesses are launched and products spun-off to other

market channels. They have helped to revitalize urban centers and bring back a sense of community. They bring fresh products into low income neighborhoods where grocery stores no longer exist. As an example of their economic impact, the Ithaca Farmers' Market has gross annual sales of \$1.3 million, sales beyond the Market from participating vendors add up to \$5.2 million. A total of 440 people are employed by the 120 market businesses with a total payroll of \$900,000. Additionally, vendors collect \$140,000 in sales tax each year.

Given that many farm direct market operations are small, they tend to use their land more intensively but with fewer chemical inputs. Many direct marketers have responded to consumer interest in low-input, IPM grown and organic foods. Hence, small scale farming is a compatible land use at the urban fringe. Urban farmers' markets can have a significant impact on ag land preservation. As an example, over 10,000 acres are maintained in farming because of NYC Greenmarkets.

Direct farm marketing has benefited agriculture by providing producers with an alternative consumer-oriented marketing system which can accommodate innovation and specialization increasing the options for all producers. Additionally farm direct marketing offers an entry point for new farmers and a means of regenerating agriculture. All of agriculture benefits from the role direct farm marketers play in educating consumers about farming. It provides the one remaining point of contact for the consumer with the food system. Policy choices pertaining to agriculture can be positively influenced because of this interaction.

Challenges

As one marketer put it, "in the 70's and 80's we grew in spite of ourselves, now in the 90's it's a different story". Challenges faced by direct marketers today include narrowing profit margins and higher costs, regulatory overload, increasing competition, and the need for constant innovation to stay ahead of consumer trends.

The cost of innovation, advertising and promotion, competition, regulatory compliance, labor, management and operations require that closer attention be paid to the bottom line, especially in larger operations. Direct marketers lack industry standards by which to measure business performance. While they track growth from year to year, there are no benchmark data on the cost of business operations relative to sales.

For part-time or hobby farmers operating costs and profit expectations are lower. At least 50% of direct marketers have sales under \$50,000. The perception of profitability in direct marketing has led many farmers and entrepreneurs to become involved only to find it more challenging and less lucrative than anticipated. Direct marketing is not a panacea for solving agriculture's income problem. Unless the size of the market expands, it becomes quickly saturated.

Farm direct retailers, unlike other retailers must live by rules that apply to farm and retail operations. Regulatory concerns include food safety, pesticides, labor and health. A checklist of regulatory compliance requirements and best management practices that apply to farm direct market operations would make compliance easier. At a community level, land use regulations may limit the ability of a direct marketer to diversify into added-value enterprises and entertainment, yet for agriculture to survive at the urban fringe, these enhancements are often necessary to justify higher labor cost, infrastructure and taxes.

As direct marketing has diversified, there are more outlets for consumers to access farm grown goods including from supermarket retailers and specialty food stores where greater emphasis is being placed on quality, appearance and local sources. Maintaining a competitive edge in the face of competition from internal and external sources will depend on customer loyalty and responsiveness to customer needs.

Food purchasing habits, lifestyle and economic health will have a large impact on the future direction of farm direct marketing. Increased consumption of fruits and vegetables, increasing consumer interest in local food sources and concerns about food safety have changed consumer shopping habits and benefited direct marketers. Societal values associated with how and where food is grown and the connection between food production and community will influence the direction of direct marketing..

If the economy remains strong, it will support the degree of diversification in direct marketing we find today, but if the economy weakens entertainment dollars may once again be turned into food dollars and economies of scale will favor the food retailer.

In the short run, success in farm direct marketing requires knowing what customers value and what experiences they expect. Capitalizing on direct consumer feedback and tracking profit centers is critical. The unique attributes of farm direct marketing cannot be lost on the consumer... whether it is a visit to a local family-owned farm, the opportunity to interact with a farmer, or purchase fresh, high quality, locally produced foods direct from the farm.

Future success will depend on understanding the benefits derived from a locally produced, fresh food supply including agricultural preservation, open space conservation, less intensive farming practices, food security, dollars recirculated locally, jobs and greater economic security for communities. Hampered by poor documentation, means that a compelling case for direct marketing that changes consumer behavior, business practices and government policies has yet to be made. The Direct Marketing Act passed by Congress in 1976 provided funds for conducting studies on the scope and impact of direct marketing. It is time that funds be reappropriated under this Act.

In the longer run, further concentration and globalization of food supply and distribution systems will create more opportunities for local producers. Small farmers unable to compete in the homogenous, concentrated national and international marketplace, have turned to satisfying the needs and niches of local and regional markets which are under-served by large scale food and supply networks. As the gap between large and small continues to widen, more opportunities are being created for small farms who can satisfy buyers unable to justify the volume purchasing requirements of larger suppliers. A key challenge is to identify under-served markets and enhance the abilities of small scale producers and direct marketers to access these. The recommendations of the Small Farm Commission are one way to make the programs of the USDA more responsive to the needs of small farmers.

FARM DIRECT MARKETING FROM A PRODUCER'S PERSPECTIVE

Jane Eckert
Vice President
Eckert's Country Store & Farms – Belleville, Illinois

The Eckert family farm operation began in 1837 when my great, great, great grandfather brought his family to Southern Illinois from Dietzenbach, Germany. The first 366-acre farm purchased in 1847 is still owned by our family.

As future generations came into the business, more farmland was purchased. Eckert enterprises from the 1950's – 1970's included a grocery store, cannery, slaughterhouse and packing plant. We were wholesale growers and packers of over 300,000 bushel of apples and 45,000 bushel of peaches. At our peak of production, we owned over 3,000 acres.

The challenges facing us then were not much different than those facing farmers today. As wholesale growers, we did not have control over the ultimate price of our product and were subject to farm labor shortages at harvest time. Therefore, in the 1960's, we researched a new direct marketing concept just beginning at the time called pick-your-own (PYO). We converted one of our wholesale farms into a pick-your-own farm in 1964 and a second location in 1968. At one time, we had five pick-your-own sites and now manage three pick-your-own retail farms plus our Country Store complex.

While the PYO concept was totally new to our area in 1964, we struggled in the early years to sell the crop direct to the customer. However, the conversion to pick your own helped ease our wholesaling pressure of finding a market for our products and dealing with a less than reliable labor source.

The PYO concept grew and became greatly successful because of tremendous customer acceptance and our access to the St. Louis, Missouri metropolitan population. Pick-Your-Own direct marketing attracted urban families to come to the country for a special experience. We offer quality, homegrown fruit at an attractive price generally below the grocery store retail. We now see families with three generations coming to our farms to continue their tradition of apple picking.

As our PYO sales grew in the 1970's and 80's, we began to sell off all of our remote wholesale apple production acreage and packing plant to allow us to focus on the retail business. We now own and operate our Country Store complex and three pick-your-own locations. Our total farm acreage now is approximately 1,200 acres. Our direct retail apple harvest is about 50,000 bushels and our peach harvest is 30,000 bushels.

The pick your own method of retailing allows us to set our own price and not be dependent on the wholesale market fluctuations thus improving our profit margins after harvest and giving us an immediate return on our crops.

Over the past 30 years, we have watched the changing family trends of reduced picking volumes. This change started to occur as more women entered the workforce and had less time to be at home canning, baking and cooking meals. Hence, the demand for large volumes of fruits by individual families has drastically been reduced.

To meet the needs of our changing customers, Eckert's as well as other direct farm marketers across North America are diversifying their businesses in order to keep the family farm viable. A major shift in emphasis for the direct farm retailer today has gone from "growing the crop" to "marketing the farm and the farm experience."

Our main farm & Country Store is now open 10 ½ months a year and our other two pick-your-own outlets are open for approximately three months. We currently have five family members and two spouses involved in managing the business and growing the crops. We permanently employ about 35 people and the number rises to over 300 during our busiest fall season. The crops we grow for public picking are strawberries, blackberries, peaches, apples, pumpkins and Christmas trees.

At Eckert farms we are approaching the direct marketing challenge in several ways and must often adjust our marketing plans based on the crop, the season of the year and each farm location. Here are some of the specific things we are doing to expand our direct farm sales.

1. We want to keep the customer on the farm longer by offering more retail variety and farm activities. (Our main farm location offers the following: Country store, gift shop, fudge counter, bakery, restaurant, custard shop, kids play area, petting farm, farm tours, special events and festivals.) We recognize that the longer a customer stays on the farm the more opportunity for an increased average sale per customer.

Our main farm hosts approximately 250,000 guests per year and our seasonal farms an additional 80,000 guests.

We breakdown our business into two operating companies. Eckert's Inc. is our retail business and Eckert Orchards handles the growing, retail harvest and pick-your-own. Eckert's Inc. further breaks down into departments with separate inventory, wage tracking and profit and loss statements.

2. We want to increase the average number of visits to the farm by our customers throughout the year by featuring a variety of events and activities. We offer the following activities for families with children: Easter egg hunt, craft classes, Mothers and Fathers day activities, gingerbread house making and breakfast with Santa. Our special events include craft shows, bike rides, antique tractor displays, and walks of the farm, featured food evenings and various crop-related themed activities.

Many of these events are partnered with local charitable and business groups.

The vast offerings of special events and festivals by Eckert's have put us in the local and regional tourism literature as a "farm destination." Because of our excellent regional name recognition and customer counts, we now have many groups coming to us wanting to partner and hold events on our farm.

3. In 1998, we converted one of our PYO farm locations into a Fun Farm where we added many family activities and entertainment along with our apple picking. We now charge a \$2.00 per person admission to enter this farm. We felt the improvements to the farm now justify an admission and will help fund future improvements that will allow us to stay competitive with other St. Louis family attractions.
4. Over the past five years our biggest area for growth has been our food service area which includes our restaurant, outdoor food stands, fudgery, bakery and custard shop. To meet this rising business demand, we expanded our restaurant facility in 1998 from 32 seats to 96 and now serve breakfast, lunch and dinner seven days a week. Future plans call for adding 42 more seats in 2000.

We have also begun to market our farm for family outings, company picnics and adult bus groups, which are a further extension of our improved food service facilities.

The retail diversification of Eckert's is intended to make us less weather and crop dependent while positioning us as a "unique destination and direct farm marketer." As the 5th and 6th generation family members are now involved in the business we are committed to provide not only the continuity of our business but to provide quality farm products and a quality farm experience for our guests.

We are not alone in this direct marketing endeavor. Eckert's is a member of the North American Farmers' Direct Marketing Association and we regularly attend their annual conferences to network with other farm owners who have embarked on this same direct marketing retail path. As past President of NAFDMA and a current board advisor, I see a strong future for our organization and for our members. Our membership not only includes established farm family businesses but we are also seeing many new entrepreneurs entering farm direct marketing. Some of our members are able to make their living from just a very active two-month fall season.

At our annual conferences we share our new and innovative retail and management ideas, listen to featured speakers and look ahead to what our customers will be wanting in the years to come. We want to keep our farms for future generations and provide a reasonable living for our families. Farmers don't always measure all of their rewards in bottom line profits yet with today's economic reality we must produce a reasonable return for our capital and assets.

I am optimistic that the trend of farm direct marketing will continue to grow and be recognized as an important use for our agricultural land.

DIRECT MARKETING OPTIONS: FARMERS MARKETS, RESTAURANTS, COMMUNITY SUPPORTED AGRICULTURE AND THE ORGANIC ALTERNATIVE

Steve Gilman
President, Northeast Organic Farming Association

As we approach the Millennium numerous opportunities are opening wide for small scale farmers serving local markets that have profound implications for agriculture and overall agricultural policy. Indeed, in a reversal of the long term trend of small farmers going out of business these local markets, driven by a rapidly growing consumer demand, are increasingly able to support larger numbers of farmers and specialty food operations in their locales. While roadside stands and Farmers Markets have been the traditional means for farmers to address and serve these markets, considerable additional demand -- and opportunities -- are coming from upscale restaurants and from consumers themselves, organized into Community Supported Agriculture (or CSA) projects. Add to this the increasing interest in Organically grown food -- where the market has been increasing at a sustained rate of over 20% a year for the past decade -- and direct marketing efforts that have been officially relegated to the lowly status of "niche agriculture" is taking on greater prominence all around the Country. The fact that this demand is deep and consumer driven means that local agriculture can longer be ignored by the publicly funded land grant research and extension programs or state and federal agricultural initiatives.

As a long time, small-scale farmer in the Saratoga Springs, New York area I have been basing my entire livelihood on such markets since 1976. One of my own personal measures of success is that all my markets are now within a 10 mile radius of the farm and the majority of my time is able to be spent farming, not running around marketing.

Ruckytucks Farm, named for the geological rock formations or "rocky tucks" particular to the area, is certified organic and produces some 140 specialty herb and vegetable varieties for top area restaurants and a 75 family CSA project. I stopped going to the highly popular, but labor intensive Farmers Market in town over 12 years ago in order to better meet the demands of these emerging specialty markets. The farm currently has 15 acres under intensive cultivation with some of the land double or even triple cropped over the course of an extended season from April to December -- not bad for our abbreviated Zone 5 growing season.

Driving this demand is a heightened consumer consciousness of the benefits of localism itself. Midst the standardized plenty on supermarket shelves with year round tomatoes, globally grown grapes and winter strawberries all shipped in from thousands of miles away is the growing idea of eating fresh foods in season for health, flavor and nutrition. Top chefs are hallmarking this concept and are leading the way in demonstrating the cuisine potential of unusual and underused seasonal food varieties.

Along with an increasing desire to support local farms for direct market fresh food production, consumers are also beginning to see the positive aspects of the local multiplier effect whereby their home spent dollars stay home to circulate and benefit the local economy. In many areas local farms are finally becoming valued for their preservation of open space, conservation of natural resources and promotion of biodiversity and there is a concerted public desire to preserve, support and protect them including the transference of development rights and reduced taxes.

Such localism may also be a direct result of increasing anxieties concerning the trends of industrialization, commodification and globalization of our food supply. As an alternative, the face to face transactions between farmers and consumers at Farmers Markets, for example, can forge highly satisfying direct and personal connections to one's food supply that is fun and socially rewarding -- and is quite apart from the mundane supermarket experience.

Community Supported Agriculture or CSA take this connection several steps further. Shareholders become members of the farm and share in its production -- and are also offered a wide range of choices for further hands-on involvement if they so desire. For instance, CSA farms may offer regular tours, farm events and seasonal celebrations which directly involve members and their kids in various aspects of farm life. Some CSAs offer Working Memberships where sharers can join in on farm tasks and participate along with other members in harvests and food distribution in return for reduced membership rates. The heightened social context and community of the organization is analogous to a food co-op, with opportunities for group decision making, including what crops to grow each season and helping to determine annual budgets.

To look a little more deeply into the consumer perspective of why they joined a CSA a 1995 study of shareholders, ("The Quest for Purity, Stewardship of the Land, and Nostalgia for Socialability: Resocializing Commodities through Community Supported Agriculture" by Cynthia Abbott Cone, Hamline University and Ann Kakaliouras, U. of North Carolina ranked their order of their interest in belonging to a CSA:

1. Source of organic produce
2. Source of fresh produce
3. Concern for a healthy environment
4. Support local food sources
5. Support the small farmer
6. Knowing where and how their food is grown
7. Desire to eat vegetables in season
8. Desire to reduce packaging
9. Health reasons
10. To participate in community
11. An opportunity to be connected to a piece of land
12. Price
13. Unusual varieties of food

14. A place to bring children

15. An opportunity to attend festivals and events

16. An opportunity to be around farm animals

Curiously, price as a major consideration is way down the list even though CSA members are asked to pay a lump sum, up front, before the beginning of the season to enable the farmer to cover seed purchases and other seasonal start-up costs. An economic study from the University of Massachusetts indicates, however, that compared to organic supermarket pricing, shareholders are receiving close-to-wholesale prices for their weekly supply of produce and are getting a good deal in return for their up front support.

What is most radical of all in this arrangement is that Sharers also explicitly agree to share in the vicissitudes of the growing season alongside the farmer. That protracted drought affecting the sweet corn production is also their drought, reflected in a diminished weekly share perhaps. An early killing frost puts an end to their tomatoes and eggplant. However, that cool snap in early June may bring on an extended season of super lush crops of snow peas and sugar snaps, much to everyone's delight. CSA growers usually grow a large variety of successive crops on the theory that no matter what the seasonal weather and conditions -- it's always a good year for some crops even if others might suffer.

It's also important to note that "Source of organic produce" is at the top of the preference list. While more and more urban areas are boasting organic food outlets and some conventional supermarket chains now feature sections carrying certified organic produce and products, dependable mainstream sources of top-quality organic foods are still lacking, particularly in more rural areas. The small scale local organic farm therefore becomes a primary link for consumers looking to buy certified produce and specialty foods and the consumer-direct, fresh-picked quality is highly competitive with the global distribution system.

Organic agriculture's solid ascendancy in the marketplace over the past decade is also closely linked to an overall increase in personal health consciousness and concern for the environment. Organic farming has become the practical alternative for those consumers who want to have choices in the marketplace for the food they eat and feed their children -- and how that food is grown and produced in the environment. As it is now, the only recourse for consumers concerned about genetically modified organisms in foods, for example, is to purchase certified organic products which explicitly forbid them. Otherwise the public is confronted with a wide range of genetically engineered foods, from chocolate to spaghetti, that are not labeled as such in the conventional marketplace. The certified organic label becomes the only available guarantee. At root, the public is voicing a strong demand for real choice in the marketplace, even if they only seek to actually exercise that choice on a limited basis.

This concern for health and the environment and honest labeling, I believe, is responsible for the tremendous public outpouring of support for a bona fide Organic Program last year. The record 280,000 comments, overwhelmingly critical of USDA's proposal, are concerned about much more than the "Big Three" issues of allowing genetically modified organisms, sludge and irradiation of foods to suddenly qualify as certifiable organic practices. The proposed Rule failed to grasp the underlying organic paradigm which does not merely substitute organic inputs for synthetic ones but encompasses holistic, ecological practices that work together in concert with the forces of nature.

One phenomenon particular to organic farms was noted at a recent regional Farmer/Scientist Conference held at Yale University in December. As organic farms mature and are able to balance their soils and develop the whole farm habitat the need for pest controls diminishes considerably as populations of beneficial insects and disease-suppressing soil organisms become established within the farm's ecosystem. On my own farm, for instance, a system of "strip-insectary intercropping" has established permanent habitat for beneficials right in the fields among the crops, resulting in my not having to use any pest controls at all for the past four years.

Conclusion:

The huge piles of grain left stockpiled with nowhere to go this past Fall when the Asian markets collapsed bears testimony to the inherent problems of the global marketplace for farmers. The industrialization of agriculture has led to an overproduction of commodities whose purported efficacy is vastly diminished when the regular environmental and health "side-effects" are factored in. Starvation in the World is taking place among Plenty -- and is more a function of economic and political conditions rather than not having enough food to go around, although feeding the World is always a primary justification for developing further injurious industrialized practices.

USDA has recently underscored the importance of this country's small farms to today's agriculture. The need for support of direct marketing initiatives to help these small farms cannot be overstated. At the same time, organic research and extension has received very short shrift indeed. The 1997 study by the Organic Farming Research Foundation, "Searching for the 'O' Word" concluded that less than 1/10th of 1% of USDA supported research projects both numerically and fiscally have specifically addressed organic needs or practices. Here at the door of the Millennium it is high time to rectify these omissions.

Thank you.

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ECONOMICS, FOOD CHOICES, AND NUTRITION

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Consumers make dietary decisions based on economic, physiologic, psychologic, sociologic and even spiritual considerations, with hardly a nod to societal implications (see, for example, Nestle, et. al, 1998). Eating in a developed country such as the United States becomes a social and family event, an act of pleasure, that goes far beyond the ingestion of the necessary nutrients to sustain life. People eat for *both* pleasure and as a biological necessity. This must be remembered if we are to understand the complex world of food choices, dietary quality, and change.

Complexity necessitates simplification and abstraction. Human behavior is complex, economic relationships are complex, nutrition is complex; put them together and the entanglements are limitless. We must have a framework to help us sort through the possibilities; abstracting from the realities of life is a requirement, not a choice. Human behavior is so complex that to understand anything a great deal must be assumed. Differences of opinion are a natural outcome of intellectual inquiry. Joan Robinson probably said it best: "The analysis can be extended to any degree of refinement but the more complicated the question the more cumbersome the analysis. In order to know anything, it is necessary to know everything, but to talk about anything, it is necessary to neglect a great deal" (Robinson, 1941).

Many forces, most outside the consumer's direct control, shape food demand and food consumption behavior. In Senate testimony more than 20 years ago, Dr. Winikoff of the Rockefeller Foundation said of nutrition, "it is affected by governmental decisions in the area of agricultural policy, economic and tax policy, export and import policy, and involves questions of food production, transportation, processing, marketing, consumer choice, income and education, as well as food palatability and availability. Nutrition is the end result of pushes and pulls in many directions, a response to the multiple forces creating the 'national nutrition environment'" (Senate Report, 1977). We focus our attention on factors influencing consumer food choices.

Our objective is to examine empirical evidence on the role and influence of economic factors, defined rather broadly, on food choices and subsequent hence, nutritional outcomes. It is not an exhaustive review, but rather we focus on selected studies whose conclusions appear to be supported by a preponderance of the literature. Our goal is to do this in a non-technical fashion. We examine factors such as food prices, household income, nutrition knowledge and awareness, time constraints and time preferences. We do break with the central design of the paper in the last section where we discuss some new, as yet unpublished, findings.

The Basic Economic Framework

One tool frequently used by economists to examine how various factors affect consumer choices is the household production model. The basic idea is that households are producers as well as consumers. They maximize satisfaction by consuming commodities they produce by combining time, human capital, and purchased goods. For example, a household may purchase a variety of food items and combine them with cooking skills, nutrition knowledge, preparation time, and kitchen appliances to produce good nutrition. The objects of desire--nutrition or health--are produced with inputs of market goods and time. This model's success stems from its integration of biological, sociodemographic, and economic factors, all of which are at work in household consumption decisions (Becker's (1965), Lancaster (1966)).

In the household production model, production activities are always subject to available technologies, income, time constraints, and other household resources used to produce nutrition and health. Technology constraints introduce biological and sociodemographic factors into the household decision process. For example, each family member's health is produced by combining time, health inputs, the sociodemographic characteristics of the household, community characteristics, and the genetic endowment of the individual. These production processes are often interrelated because some intermediate goods produced by a household such as meals are often used as inputs into the production of a final commodity, like health.

The income constraint ensures that the household expenditure on purchased goods and services does not exceed money income. The time constraint ensures that the sum of all time inputs into the production of commodities plus leisure time and time spent at work does not exceed the total time available. The income and time constraints are also intertwined since labor earnings depend on time spent at work and the more time spent working means less time available for meal preparation and other household activities. These interlinkages are sometimes characterized in the old adage 'time is money.'

Households attempt to maximize their satisfaction by taking into account the prices of purchased inputs, wage rates, household income, as well as their sociodemographic characteristics to derive their demand for commodities (such as nutrition and health) and market goods (such as foods and medical services).

The use of the household production model to study the determinants of health, health behaviors, and health inputs was pioneered by Grossman (1977). Grossman's approach grew out of the recognition that many consumer choices, such as those relating to the amount of exercise, the nutritional quality of diets, and the purchase of medical services, are not made because consumers gain utility from these choices directly, but rather because these choices influence health. Health, in turn, is demanded because it is a source of utility and because it determines income, wealth, and overall well-being .

One distinctive element of the economic approach is the framework used to understand and quantify life's tradeoffs. In our view, consumers face four fundamental, but not necessarily mutually exclusive, tradeoffs in the food choice and nutrition arena. The first is between nutrition and taste. Can information or product development improve the terms of this tradeoff? The

second tradeoff is between nutrition and costs -- the usual refrain that it costs too much to eat healthily. In modern America, the tradeoff between nutrition and convenience is of paramount importance as incomes increase and time constraints become tighter. Time is, of course, the ultimate equalizer; everyone is limited to only 24 hours a day. The fourth tradeoff is between known short-term costs -- in terms of time, money, and perceived sacrifices in taste -- and the uncertain long-term benefits of healthy eating. Given this paradigm, what can economists contribute to solving the mystery of *why Americans with an abundance of nutrition information, high incomes, and low food prices don't eat better?*

The Old Standbys: Prices and Income

The Federal government has conducted many nutrition education campaigns to help consumers make healthy food choices, but economic factors such as food prices and consumer income are also important determinants of food choices with direct consequences for nutrient availability. For example, if the price of beef increases while the price of chicken remains the same, consumers will buy less beef and more chicken. However, other foods -- such as hamburger buns and cheese -- will also be affected. The same principle applies to consumer income. Consumers have budget constraints to live within -- one dollar spent on chicken is one less potential dollar for beef. Supermarkets often with more than 150,000 different brands and products available on their selves, are full of these potential tradeoffs for consumers (Gallo, 1996).

Rising income has been a major factor influencing food choices. In general, higher income has two results: it expands the set of potential purchases and earning it takes time. Consequently, income is inextricably linked to the demand for convenience foods and food away from home.

Over the past two decades, the overall price of food has risen about the same as that for nonfood while consumer incomes have risen dramatically (Putnam and Allshouse, 1997). Together this means that food is more affordable than ever -- Americans spend only about 11 percent of their incomes on food -- and higher incomes allow consumers to purchase higher quality foods, eat foods considered more enjoyable, and dine out more often (Putnam and Allshouse, 1997). The American Heart Association identified easily affordable food as one of the root causes of the over-consumption that is making obesity a major risk factor for heart disease (AHA press release, 1998). However, some people believe that food prices are still a barrier to healthy eating. A 1995 survey by the Food Marketing Institute and Prevention magazine found that 51 percent of consumers agreed with the statement "It costs more to eat healthy foods." In some ways this is true and may particularly impact low-income consumers. Frazao and Allshouse (1996) found that food products modified in fat, sodium or other food constituents generally cost more than their standard counterparts (See also Nestle, 1994). If consumers believe that dietary change requires using these specialty products, they will perceive change to cost more. Frazao and Allshouse also found that sales volume for all 37 food categories analyzed rose 10.9 billion pounds from 1989-93 with nutritionally improved versions contributing 78 percent of that increase. However, other research indicates that it is possible to eat healthy using standard products that are less expensive, but perhaps require some sacrifices in taste (McAllister et al. 1994).

Understanding Price Changes

Several recent studies have examined the complex changes in consumption that would result from price changes for various commodities and the subsequent impact on the availability of nutrients in the US food supply (Huang, 1993, 1996). These studies found, for example, that an increase in beef prices decreases daily availabilities of calories, total fat, cholesterol, protein, and saturated fat and increases the availability of vitamins A and E. However, it decreases the availability of calcium, iron, and fiber. These results highlight the interdependence among food choices. For example, an increase in the price of beef is associated with decreased consumption of some grains, fruits, dairy products, and vegetables, which explains the decreased availability of fiber and calcium. Because of the interdependence of food choices, well-intentioned proposals such as a “fat-tax” need to be carefully analyzed for any unintended implications.

Income and Convenience

Several economic studies have estimated the effects of economic, regional, and demographic variables on food expenditures (Blisard and Blaylock, 1993; Blaylock and Smallwood, 1986). The more recent analysis found that food away from home was 3 times more responsive to income changes than food at home but found mixed evidence that rising incomes increase the demand for individual high fat and cholesterol foods. The largest income response for an individual food was for “other dairy,” a mixture of low- and high-fat items. The second most responsive food was fresh fruit, very low in fat and cholesterol. However, cheese, a high-fat item, had a relatively high income response.

Comparing income responses between the two studies gives an indication of changing economic responses over time, which may be caused by changes in incomes or consumers perceptions of food qualities. In general, the more recent study found lower income responses than the earlier one. Food away from home retained its very high response to income, but the response of food at home dropped sharply. The income responsiveness of meat, poultry, fish and eggs declined by 50 percent, while the income responsiveness of eggs became negative, consistent with other studies. Fresh fruit became more responsive to higher income, while butter’s response declined sharply. This evidence supports the notion that responses to income change over time as consumers reevaluate foods’ characteristics. These changes are consistent with a shift toward healthier diets, although changes in relative prices and other factors cannot be ruled out by examining just these two independent cross-sectional studies.

Two recent studies have explored the effect of information by examining national consumption and price data for cholesterol and the fats and oils complex. (Brown and Schrader, 1990; Yen et. al., 1996) Brown and Schrader found that the increase in information about cholesterol decreased per capita egg consumption 16 percent over the 1955-1987 period. Yen et. al. found that information changed demand for fats and oils; in particular, resulting in reduced consumption of butter and lard, but not necessarily all fats and oil. Thus, it is not inevitable that affordable food will defeat nutrition information in determining diets.

In summary, evidence is somewhat mixed on the impact of rising income on the demand for individual foods with particular nutrient profiles has increased or decreased. In sharp contrast to the above, there is no debate that food away from home is becoming ever more popular and that

income and economic forces are the major determinants. The reasons are well-known: higher incomes, convenience, more women in the labor force, and smaller households. The frequency of dining out increased by more than two-thirds over the past two decades rising from 16 percent of all eating occasions in 1977 to 27 percent in 1995 (Lin, Frazao, and Guthrie, forthcoming). Consequently, a greater proportion of nutrient intakes have been obtained from away-from-home food sources. For example, food away from home provided 34 percent of total caloric intake in 1995, nearly double the 19 percent in 1977. Similarly, away-from-home foods provided 38 percent of total fat intake, 29 percent of total calcium intake, and 27 percent of total iron intake in 1995, compared with 18, 17, and 16 percent, respectively, in 1977.

Rising consumption of food away from home may make it more difficult for consumers to make informed choices regarding the nutritional content of meals. Many people, including many dieticians, have a very difficult time measuring the nutritional quality of a meal or a mixture of foods. In fact, 203 dietitians were asked to guess the amount of fat and calories in 5 prepared meals (Center for Science in the Public Interest; New York Times, 1998). They were generally way off the mark. For example, a hamburger and onion rings, with 1,550 calories and 101 grams of fat, were surmised to have only 863 calories and 44 grams of fat. This has become an increasingly important problem in our society as dining out, fast foods, home delivery, and prepackage meals become an ever growing part of our culture. People may be aware of the nutrient content of a particular food but the situation becomes more complex when foods and ingredients are combined in unknown portions with unknown preparation methods.

A recent study has also shown that between 1977-1995, smaller nutritional improvements occurred in foods prepared away from home than in home foods, and, in 1995, away-from-home foods typically contained more of the nutrients over consumed and less of the nutrients under consumed by Americans than home foods (Lin, Frazao, and Guthrie, forthcoming). For example, fat provided 41 percent of calories for both home and away meals in 1977. By 1995, the fat content of home foods had declined steadily to 32 percent of calories but only to 38 percent for foods away from home. A similar story holds for saturated fat.

Interestingly, since food away from home contains more fat and cholesterol and less fiber, its higher income response could counter improved knowledge and attitude effects that may come with higher income. This question is addressed later.

Perceptions Often Do Not Match Reality.

Nutrition advice is often given, with some notable exceptions, in terms of eating less of this nutrient or more of another. This advice rests on the assumption that people know not only what nutrients are in the food they eat, but also the quantities -- especially difficult information to obtain when dining at the local cafeteria or steakhouse. Herein then lies the dilemma: What if actual intakes vary significantly from perceived intakes? All the dietary advice in the world will fall on deaf ears if people *believe* their diets are meeting dietary recommendations. Unless someone is gaining unwanted weight or experiencing some health problem they are likely to reach the reasonable conclusion that nutrient supply equals nutrient demand. That is, change is not necessary. The evidence is not encouraging. Approximately 30-percent of Americans believe their diets contain about the right amount of fat for a healthy diet and another 46 percent believe

their diets contain too much fat (Bishow, Blaylock, and Variyam, 1998). The fact is that both groups obtain 37 percent of their calories from fat sources. Both of the groups present challenges for nutrition educators. The optimists may not respond to nutrition advice since they believe their diets conform already to dietary guidelines and the realists simply may not see a need for change.

Time Preferences and Constraints

Today's nutritional issues are driven by the discovery of strong links between nutrition and chronic diseases, such as coronary heart disease, cancer, and stroke. Nutritional concerns now focus on excessive consumption of fats, saturated fats, and sodium and the under consumption of some nutrients and food components, such as calcium, dietary fiber, and iron. Whether the problem is over-or-under consumption, the common denominator is that the associated health outcomes are often slow to manifest themselves and in many cases may never appear. This uncertainty and delayed impact effects consumer behavior. There is simply no guarantee to a consumer that a lifetime of healthy eating will result in reduced morbidity outcomes or increased longevity. Perhaps all that is required is to begin practicing good nutrition at some point in life or substitute medical inputs for that low-fat, high fiber diet. Economists simplify these behavioral phenomena into a factor often referred to as time preferences.

In the long-run, taste considerations may simply prevail; habits and other forces may be too difficult to overcome. Similarly, the uncertain future benefits of better nutrition -- you have to die of something -- may outweigh the perceived potential benefits of healthy eating. Put differently, for many people healthy eating is just not worth the effort and sacrifice. The latter may be a particularly difficult phenomena to overcome since Americas seem to discount the future heavily. We need to look only at the nation's extraordinary low savings rates or the high credit card balances for evidence. Convincing people of the long-run benefits of good nutrition is clearly made more difficult if immediate gratification is given a higher priority.

Time constraints are another important consideration. Time is required to obtain nutrition information and to purchase and prepare nutritious food competes with time that could be used in labor markets, for leisure, or at the shopping mall.

Time constraints also affect the gathering of nutrition information. A consumer seeking nutrition information can use a variety of sources, each with a time and monetary cost and a perceived contribution to their well-being. Advertisers' information will have the lowest cost, but not necessarily the highest perceived contribution. Generally, consumers obtain information from sources low in search costs, but value information from other sources more highly. In one poll, respondents cited print media and TV as the most common sources of nutrition information, but cited doctors, books, and dietitians as the most useful. Family and friends fell in between. This apparent discrepancy between use and usefulness is consistent with the costs of information sources; information from medical professionals is both expensive (in time and money) and rarely used. Gleaning information from books takes time and is rarely sought. Virtually free information through the mass media is widely used, even if given marginal value.

Food is the second most advertised product category (Gallo, 1996). With a bewildering array of food items from which to choose, research indicates that the average consumer takes only 12 seconds to make a brand selection with nearly half choosing in one second (Moorman, 1996). That is not much time to compare prices or check a nutrition label. Of course, Madison Avenue with sixteen billion advertising dollars seeks to help us here. Not surprisingly, most of these advertising dollars promote prepared and convenience foods, snacks, and alcoholic beverages. As a reference point, the Federal government spends about \$326 million annually promoting the Food Guide Pyramid and other healthy eating practices (USDA Report to Congress, 1995).

Time constraints were cited as an obstacle to better nutrition by 21 percent of consumers (ADA, 1995). Mothersbaugh et al. (1993) found that time constraints had a negative effect on an individual's adherence to recommended dietary practices. However, increased nutrition knowledge, such as better meal planning and preparation skills, offset the negative effects of time constraints. Confusion about dietary advice is also a form of time constraint. About 21 percent of consumers agreed that there are so many conflicting studies they don't know what to believe (ADA Nutrition Trends Survey). This makes it very time intensive, or impossible, to sort through the masses of information. The development of the *Dietary Guidelines for Americans*, which give a clear and consistent message to consumers about what they should eat to be healthy, is one approach to solving this problem. Continued promotion of the Dietary Guidelines as a source of consistent, reliable advice may help overcome this barrier (Sutton et al., 1995).

Nutrition Knowledge, Attitudes, and Awareness

Most paradigms assume that when the consumer is provided with knowledge -- nutrient content of foods, for example--attitudes toward diet will change, resulting in changed dietary behavior. However, knowledge by itself will not affect behavior; motivation must be provided. The motivational knowledge could be that healthy eating will produce better health and reduce risks of chronic diseases. Of course, the costs of acquiring and processing information are important constraints.

One convenient way of characterizing nutrition is the Rogers system, which identifies three types of knowledge: awareness, knowledge of principles, and awareness of diet and health relationships (Rogers, 1983). To this list, we would suggest adding attitudes and barriers to change.

Awareness of Diet and Disease Relationships

Awareness of a relationship between diet and health is assumed to be the first step in motivating interest for acquiring knowledge about healthy eating choices. Americans show fairly high levels of awareness of relationships between diets and chronic disease, such as heart disease and cancer (Levy and Heimback, 1989; Ippolito and Mathos, 1995, 1996). In general, consumers are aware of health problems associated with many nutrients. For example, 71 percent of consumers are aware of health problems associated with how much fat a person eats; 59 percent are aware of the health/saturated fat intake, but only 48 percent are aware of the association between health and iron intake (Variyam, Blaylock, and Smallwood, 1997).

Furthermore, consumers are becoming more aware of diet/health relationships. Less than 20 percent of consumers were aware of a linkage between fats and heart disease in 1982, but more

than 25 percent now know of the link between cholesterol and heart disease (Guthrie, Derby, and Levy, 1998). By 1995, 60-percent of consumers know of the fat/heart disease association, far out pacing cholesterol in the public's eye as the key dietary risk factor for heart disease. Interestingly, saturated fat has not penetrated the public consciousness. Only about 5 percent of consumers thought the relationship between saturated fat consumption and heart disease was an important risk factor, unchanged for 13 years.

Awareness of links between diet and cancer has also increased but is below levels for heart disease. In particular, more than 30 percent of consumers mention fruits and vegetable consumption as associated with cancer, up from about 15 percent in 1984 (Levy and Derby 1995, 1996).

However, awareness of health problems associated with diets is not a panacea. Awareness of the link between weight and health is virtually universal, but obesity is a widespread problem (Kuczmarski, et al., 1994). The same is true for calcium. Despite widespread knowledge of calcium and health relationships, consumption is still below recommendations for women over age 20 (Tippett, et al. 1995; Food Surveys Research Group, 1996). Other factors are clearly intervening.

Knowledge of Nutrition

Knowledge of nutrition can take two general forms: knowledge of principles (e.g., advice about the percent of calories that should come from fat) and knowledge of the specific nutrient content of a food. The extent of consumer knowledge in these areas is mixed (Levy, Fein, and Stephenson, 1993). Only 33 percent of consumers know that saturated fat is more likely to be a solid while 39 percent are aware that cholesterol is found only in animal products (Variyam, et al. 1997). In terms of knowledge of the nutrient content of foods, consumers do better. For example, almost 90 percent of consumers know that regular hamburger contains more fat than ground round; butter contains more cholesterol than margarine; and white bread has less fiber than wheat bread (Variyam, et al. 1996, 1997).

Knowledge of nutrition principles, like awareness, is not a panacea. Despite high levels of knowledge, fiber consumption is low and fat consumption is high, suggesting intervening factors, such as the demand for convenience, dining out, and taste considerations are having a significant influence.

Attitudes About Attributes

Nutrition knowledge arms the consumer with tools for instituting change but the consumer's attitude determines whether the motivation exists for making the change (Axelson and Brinberg, 1989). Attitudes are subjective and involve the tradeoff between one attribute of a food, meal, or diet against another. If consumers do not value the nutritional qualities of foods more than taste, convenience, or price then they may not choose nutritious foods, regardless of knowledge levels.

Surveys by the Food Marketing Institute indicate that more than 75 percent of consumers place a high value on nutrition, but almost 90 percent value taste and 64 percent think price is very important (Food Marketing Institute, 1989, 1995-97). Evidence from USDA surveys indicate

that 67-percent of consumers believe choosing a diet with plenty of fruits and vegetables is important; 61 percent a low-fat diet; and 37 think people should eat at least two servings of dairy products daily (Guthrie, Derby, and Levy, 1998). Seventy-five percent thought it very important to maintain a healthy weight (Guthrie, Derby, and Levy, 1998). Positive attitudes about nutrition may motivate change; negative attitudes present a barrier. A American Dietetic Association survey indicates that 38 percent of consumers believe that to improve their diets requires giving up favorite foods (ADA, 1995).

ERS Studies of Nutrition Information

Economic Research Service (ERS) has been conducting recent studies using data on individuals to explore the influence of nutrition knowledge, attitudes, awareness of diet/health links, income, education, and personal and household characteristics on diet quality and nutrient intakes. ERS has published detailed analyses of consumer intakes of fat, cholesterol, fiber, and as well overall diet quality (Variyam et al , 1997, Variyam et al, 1995, Variyam, et al., 1998). Recent work has focused on examining the influence of a mother's nutrition information on the diets of her children. These studies use two surveys of the same population: the Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS) of USDA. The CSFII is an interview and diary record of food ingestion for a three-day period. The DHKS is a follow-up telephone survey with the "food managers" of the responding households, and contains questions on knowledge and attitudes about nutrition.

The ERS work is unique in several ways. First, direct measures of nutrition knowledge are used. Previously, only Kenkel in the health area has used direct measures of information to examine the demand for physician services and the role of schooling in the choice of healthier habits (Kenkel, 1991) Prior studies have used proxies for nutrition knowledge, such as years of education or income that may account for information differences among people. The problem with this approach is that such variables have a direct effect on health input choice, besides their indirect effect on input choice through information. These direct and indirect effects cannot be separated without explicitly modeling information separately from diet quality or nutrient intake, that is, treating information as an endogenous factor. This has the important implication that key diet quality determinants, such as education and income, as well as other personal and household characteristics may influence both quality and nutrition information levels simultaneously. For example, this approach allows the separation of income effects into a direct effect on quality because of purchasing power or time constraints and an indirect effect thought nutrition knowledge. Consequently, it may be the case that income increases fat intakes because it increases the demand for fatty meats but at the same time, since income and nutrition information levels are related, it may have a dampening impact on fat intakes. Heretofore, these types of impacts could not be separated. Lastly, the ERS approach assumes that nutrition information cannot be directly observed (a latent variable) but can only be indirectly measured via various indicators. For example, questions probing diet-health awareness were combines to form a single underlying measure of diet/nutrition knowledge (see Table 1 for examples). Similarly, questions on nutrient content knowledge were used to form a specific measure of content knowledge.

Research Findings from One ERS Study

A recent ERS study examined the influence of maternal nutrition knowledge and other maternal characteristics on the diet quality of children between 2 and 17 years of age. Diet quality is assessed using the Healthy Eating Index, U.S. Department of Agriculture's instrument for measuring overall diet quality incorporating 10 recommended nutritional guidelines (USDA, 1995). Much of the existing research on a maternal role in children's health and nutrition is in the economic development literature (Barrera, 1990; Behrman, 1995; Behrman and Wolfe, 1987; Haughton and Haughton, 1997; Kassouf and Senauer, 1996; Senauer and Garcia, 1991; Thomas and Strauss, 1992), and only a few studies have provided direct evidence on the role of information (Thomas, Strauss, and Henriques, 1991). Relatively little is known in the U.S. context about the relationship between a child's diet and the nutritional literacy of the person responsible for meal planning or preparation--often the mother. The existing U.S. evidence linking parental nutrition knowledge and children's intake of nutrients is mixed (Colavito et. al., 1996; Klesges et. al., 1991). Lack of controls for measurement errors and endogeneity of parental nutrition knowledge may have contributed to these inconclusive results.

Presented in Table 1 is a sample of the types of indicators used to develop the measures for nutrient content knowledge and awareness of diet-disease relationships. While nutrition knowledge may be increasing for the population as a whole, levels vary widely among different population groups. For example, income and education have similar effects: the more you have the more you're aware of diet-disease relationships and the more nutrient content questions you can answer correctly. Whites answered more nutrient content questions correctly and were more aware of diet-disease relationships than nonwhites. Ability to answer nutrient questions also varied by ethnicity. Knowledge differences varied little by mothers' age.

Maternal Knowledge and Childrens' Diet Quality

The ERS study found significant evidence that greater maternal health and nutrition knowledge leads to better diet quality for preschoolers but not necessarily for school-age children after accounting for the influence of maternal background characteristics, health habits, and household characteristics. *Nutrition information makes a difference.* These results lead to the conclusion that health and nutrition education may be more effective if targeted toward mothers with young children and school-age children.

ERS research suggests that both maternal education and household income have positive effects on maternal nutrition knowledge, consistent with the hypothesis about their role in increasing access to and use of information (Ippolito and Mathios, 1990). Like Thomas, Strauss, and Henriques (1991), ERS finds that after the knowledge-enhancing role of maternal education is taken into account, its direct effect on child diet quality is negative. Conditional on nutrition knowledge, education may be increasing the demand for convenience foods and food-away-from home, both have been found to be of lower dietary quality (Lin, Guthrie, and Blaylock, 1996; Lin and Guthrie, 1996).

Mothers' age may capture the effects of learning and experience that remain after controlling for her schooling. Height is a key variable used in many previous studies to control for maternal background effects (Behrman, 1995). Consistent with previous results, ERS finds that maternal

age and height are significantly related to higher childrens' diet quality (Barrera, 1990; Haughton and Haughton, 1997; Thomas and Strauss, 1992). However, neither maternal height nor age has information-related effects, suggesting that they capture maternal background and endowment effects that do not influence information acquisition. For example, older mothers may have developed "rules of thumb" about food selection and preparation techniques that translate into healthier diets, holding nutrition knowledge levels constant.

Excepting Haughton and Haughton (1997) in a developing country context, few have studied maternal weight as an explanatory variable. While they found a positive relationship between child nutrition and maternal weight, ERS finds that maternal weight has an inverse relationship with childrens' diet quality through its influence on maternal nutrition knowledge. One explanation is that obesity may be discouraging mothers from investing further in information acquisition and processing. This conclusion is supported by the fact that the adverse influence is greater at higher weight levels. These opposite findings are clearly related to the fact that in developing countries, weight is a positive indicator of health since under consumption of foods and nutrients related to weight is the major problem. In the U.S. and other industrialized countries, overweight or obesity is a negative indicator of health. Therefore, both results confirm the underlying relationship that maternal health endowment is positively related to children's nutritional outcomes.

One key variable overlooked in the children's health and nutrition literature is maternal time preference. Several studies have emphasized that health habits as well as other human capital choices may be affected by an individual's time preference (Farrell and Fuchs, 1982; Grossman and Kaestner, 1995). An individual who places a higher value on current enjoyment may place less value on healthy habits, education, and information acquisition activities compared to those who place a higher value on future enjoyment. In the mother-child context, this means a positive effect of maternal education or maternal health knowledge on child nutrition may be due to a mother's lower time preference which places a higher value on both her and her child's future health. To estimate the 'true' education or information acquisition effect, it is necessary to have a control for maternal time preference. In the ERS study, mothers' smoking status is used as such an indicator (Evans and Montgomery, 1994). Results indicate that maternal smoking has a substantial negative effect on children's diet quality. The sizable effect of maternal smoking status is also not related to information. This poses a challenge to nutrition educators since standard nutrition information programs are not likely to lower the dietary risk of children with smoking mothers. This result also has important policy implications given that earlier studies have found that smoker's own diets are substantially worse than of nonsmokers (McPhillips, Eaton, and Gans, 1994). An earlier study of the diet quality of household main meal planners found that smokers have significantly lower Healthy Eating Index (HEI) scores than nonsmokers (Variyam, Blaylock, Smallwood, and Basiotis, 1998). The present results show that this negative effect is transmitted to children with essentially a similar, if not a higher, magnitude. Therefore, nutrition education programs need to target smokers, particularly those who are the main meal planners of their household, and alert them to the possible negative influence of their health habits on their children's diets.

In previous studies, children's age and sex have been included to capture possible gender and age discrimination in the allocation of household resources. To the extent that children's diets are

under parental control, gender or age differences were not expected in the ERS study and none is found. Among household characteristics, there is a large positive effect for children from households where at least one member is on a vegetarian diet. As the *Dietary Guidelines for Americans* notes, vegetarian diets are consistent with its recommendations and can meet Recommended Dietary Allowances for nutrients. This result and the result for smoking show how strong intra-family effects are generated by the health habits of individual members of the household.

Other household characteristics are generally insignificant, except race, in explaining variation in children's HEI scores. HEI scores for black children are lower than those of other races. Given the potential effect of such higher dietary risk for preschoolers on their future health and schooling, this is a clear indication that nutrition education programs should target black households for special attention.

The effects of nutrition information sources are as expected. Time spent watching television is inversely related to knowledge, possibly because it curtails more information-intensive activities like reading. The effects of receiving dieting advice from a physician or a dietician, and the education level of the male head have positive effects on children's HEI, working through increased knowledge.

Summary

Overall, it appears that the forces of rising incomes, time constraints, time preferences, and moderate food prices are outweighing nutrition and health information. Between 1970 and 1994, the calories available in the food supply rose 15 percent (Putnam and Allshouse, 1997). In 1998, the American Heart Association declared obesity a risk factor for heart disease while citing increased levels of obesity in the United States, from 25 percent in 1976-1980 to 36 percent in 1997. The increase in obese Americans accompanied a decline in the percent of calories from fat: from 40 percent of the diet in 1965 to 34 percent in 1991. Obesity is probably due to greater caloric intake and inactivity (American Heart Association, 1998).

These trends may not be inevitable. Economic studies reveal that consumers' response to changes in income can change in a direction consistent with nutrition information. But even after these changes, increased incomes continued to lead to higher food intakes. A population which is putting itself at risk through eating calls for information strategies that can balance economic forces.

Other evidence reveals improved knowledge over time. On balance, Americans appear to be acting on nutrition information, but offsetting the cumulative effect on their total diets with increased calories and added fats and oils. These two trends reflect both economic forces--income and a desire to save time--and possibly less recognized calories and fat in processed foods. The economic forces will continue to operate but there is hope that the information effects of increased incomes and schooling will eventually offset their more direct effects. Additionally, time preferences may change. A substantial improvement in overall diet quality could arise, if Americans become convinced that longer term gains in health can become a reality through short-term modifications in eating habits.

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Table 1 -- Sample of Nutrition Knowledge Questions and Mothers responses

Question	Percent of Correct Responses
Which has more fiber?	
<u>Fruit</u> or meat	81.8
<u>Whole-wheat bread</u> or white bread	92.9
<u>Kidney beans</u> or lettuce	53.6
Which has more cholesterol?	
<u>Butter</u> or margarine	83.8
Egg whites or <u>yolks</u>	79.2
Skim milk or <u>whole milk</u>	95.5
Which has more fat?	
<u>Regular hamburger</u> or ground round	86.7
<u>Hot dogs</u> or ham	66.6
<u>Peanuts</u> or popcorn	89.6
Yogurt or <u>sour cream</u>	87.3
<u>Porterhouse steak</u> or round steak	52.3
Which kind of fat (<u>saturated</u> , <u>polyunsaturated</u>) is more likely to be a liquid rather than a solid? Or are they equally likely to be liquids?	26.9
Is cholesterol found in vegetables and vegetable oils, <u>animal products</u> , or all foods containing fat or oil?	35.1

Source: 1989-90 Diet Health Knowledge Survey.

Note: Correct answers are underlined.

**Table 1 cont. --Diet-health knowledge questions and percent responses
Children's Nutrient Intakes Study**

Question	Percent of "Yes" Responses	
	Age 2-5	Age 6-17
Have you heard about any health problems that might be related to how much:		
Fat a person eats?	70.8	74.0
Saturated fat a person eats?	57.5	61.9
Fiber a person eats?	47.1	51.3
Salt a person eats?	81.5	88.8
Calcium a person eats?	63.6	63.9
Cholesterol a person eats?	85.7	85.9
Sugar a person eats?	80.5	80.9
Iron a person eats?	54.9	52.0
Being overweight?	87.0	90.9
N	308	538

Source: 1989-90 Diet Health Knowledge Survey.

CAN U.S. AGRICULTURE PRODUCE THE BASIC FOODSTUFFS CONSISTENT WITH THE DIETARY GUIDELINES?

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Introduction

Nutritionists at a recent Washington conference argued that Americans eat an unbalanced diet, contributing to numerous health problems (Schneeman).¹ Their position was supported by McNamara, Ranney, Kantor, and Krebs-Smith, who compared an aggregation of US food needs based on the Pyramid Dietary Guidelines to US food supply. McNamara et. al. found substantial deficits in fruit, vegetable (other than potatoes) and dairy consumption. If Americans are to eat a more balanced diet, food supplies will need to adjust to accommodate these nutritional needs, and more of the foods in deficit may need to be produced, while output of other foods could decline. This raises the questions: How would American agriculture cope with providing a better diet, and what forces (on the supply side) may prevent it from doing so now?

The initial purpose of this presentation is to examine the potential of American agricultural production to shift toward providing a healthier diet. As a trade economist, I believe that transition would be dictated by the interaction of production potential with export demand, and by consumer preferences and food processing and distribution firm marketing strategies – more so than by the capacity of American agriculture to fill identified gaps. While trade has not played an important role historically for the products in deficit, they are among the more rapidly growing components of US agricultural trade, and several factors identified here will make it easier for trade to meet any new demands in the future. Thus, if American consumers demand a healthier diet, adjustments will occur in both production and trade patterns.

This issue is explored by first considering the capacity of American agriculture to fill identified gaps, and the extent to which production responds to demand rather than need. Then reasons why trade has historically been less important for food products in deficit, but may become more important, are examined. The size of identified gaps, and the effects on international markets are then considered in the context of studies examining the capacity of world agriculture to meet demand and need. An example of tomato juice trade is then used to show implications of new trade theory for how international markets may in fact respond, and illustrate the importance of firm marketing strategies. Conclusions emphasize the importance of consumer demand driving production and trade outcomes.

U.S. Production Potential

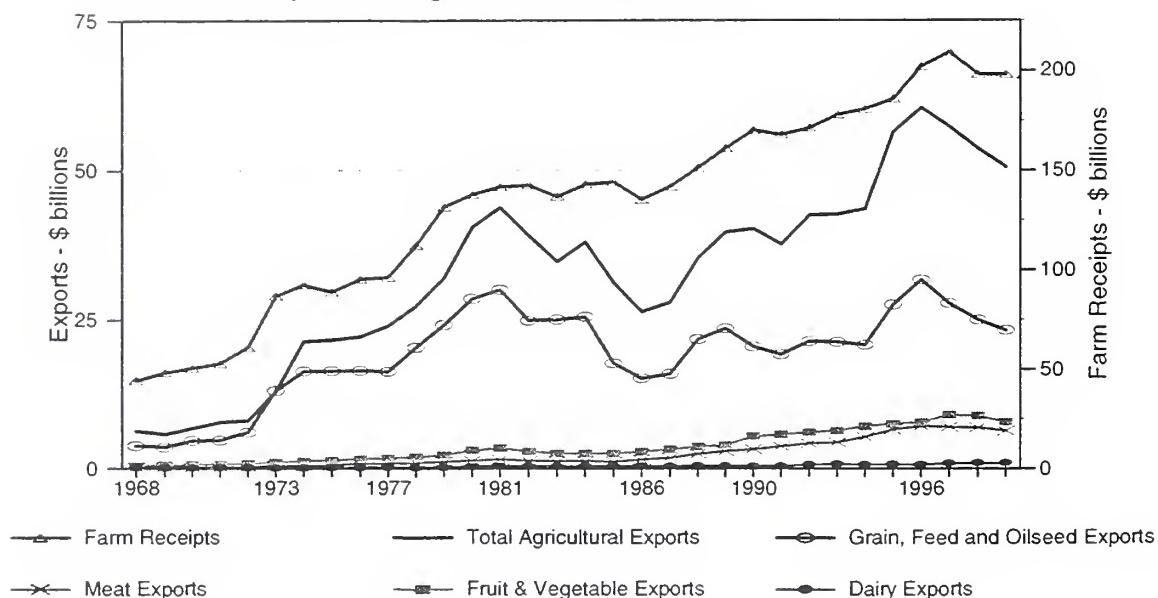
US agricultural production has grown faster than domestic demand over recent years, generating substantial exportable surpluses. US agricultural trade took off following the price spikes of the 1973 world food crisis, and US agricultural production followed that demand trend. When in

1981 export demand growth stalled, production growth slowed, but evidence of surplus capacity emerged. In 1986 export demand growth resumed, along with output growth.

These trends are shown in Figure 1, along with some detail on the composition of US agricultural trade growth. They show volatility in trade of grains, feeds and oilseeds leading to observed variations in farm income and output trends. Trade in meats, fruits and vegetables has been steadily increasing since 1986, having been quite small before then. These data and the market history behind them are intended to support the claim that demand (in this case exports) induces supply growth in these markets, and that when demand is growing production catches up.

Figure 1.

Farm Receipts and Agricultural Exports



Behind these trends, though not shown in these graphs, are price trends which reinforce this story, and reinforce as well the belief that agriculture is one sector of the economy where price incentives are critical to production trends. For increased output in fruit, vegetable and dairy sectors, farmers will need to realize higher prices and profits. If price signals indicate that the demand for more of certain agricultural products exists, production patterns will follow. Hence, most economists at the Dietary Guidelines conference saw production potential as a non-issue in this debate. The key concern was whether consumer demand will call for healthier foods.

Two participants at the Washington conference with closer ties to production agriculture also argued, from their different perspectives, that American agriculture could meet demands placed on it, and would better serve nutritional needs if demand patterns better reflected those needs. Zilberman noted that the concern to be examined is whether resources used in agriculture are adequate, and can shift, to meet differing production patterns. His answer was yes, and he explicitly observed that irrigated areas in California can shift to higher value crops to accommodate nutritional need. Duxbury and Welch offered a similar perspective from two agronomists, noting that most regions in the US were far more self-sufficient in fruit and

vegetable production in the past, and could be again if incentives permitted them to profitably do so. The market has at this point has permitted California's dominance in these products, and has determined the observed, specialized production and trade patterns.

Each of these perspectives suggests that the resource capacity exists to meet consumption patterns more closely related to nutritional need. Moreover, it is argued here that capacity will not be heavily taxed if Americans do demand a better diet, as adjustments will depend more on how international trade interacts with demand to meet need.

Role of Trade in US Food Supply

International trade and agricultural production overseas have historically played only a small role in meeting U.S. food needs, especially for fruits, vegetables and dairy products. Table 1. demonstrates this point while at the same time reporting the extent of food gaps by product group. It shows the considerable surpluses generated by American agriculture for grains, and that for most other products self-sufficiency ratios are near or above 100%. For grains, international trade has at times been viewed as a residual demand component utilizing excess U.S. production capacity. Market characteristics are quite different for the other products, where in spite of self-sufficiency there are often imports, which are in a few cases substantial. Explaining this requires that we note the existence of substantial two-way trade (exports and imports coexisting), a phenomenon inconsistent with all but the most modern theories behind why trade patterns are what they are (Ethier). For fruits, vegetables and dairy products, seasonality in production and demand for variety account in part for these trade flows, and raise issues of product differentiation (read marketing strategy) to explain why trade occurs as it does.

The capacity of international markets to supply products in deficit coupled with recent, accelerating trends in trade in those commodities points to the enormous potential for trade to contribute to filling any US food supply gaps. Rapid growth in the last 15 years for products in deficit raise the question why did the US not rely in trade in these products earlier, and what has changed to encourage both imports and exports of these products?

Why trade has been unimportant as a source of US supplies?

Several reasons explain the earlier trade patterns, and low trade levels for fruits vegetables and dairy products. Most countries, including the U.S., have been largely self-sufficient, especially in vegetables and dairy. This has been determined by policy decisions and transportation costs limiting international flows of these products.

Perishability and quality losses make transportation costly. This is true of agricultural goods relative to industrial goods, accounting in part of greater self-sufficiency in agricultural trade, and is especially true of fruits, vegetables and dairy. Where transportation is less costly -- for grains and oilseeds -- the share of product traded is generally much higher. In the past for some products, when there was trade it was largely in a highly processed form, such as for non-fat dry milk, which was much easier to transport.

Table 1. Contribution of International Trade Toward Filling the US Food Supply Gap

US	Food Supply Gap	Self - Sufficiency	Import Contribution
Grains	10.5%	335.0%	27.7%
Vegetables		101.6%	8.9%
Potatoes	-47.9%	101.6%	6.3%
Others	31.0%	101.7%	11.7%
Fruit		81.9%	39.0%
Citrus	68.8%	91.8%	29.9%
Other fruit	64.3%	75.1%	45.2%
Dairy	46.8%	95.6%	6.4%
Meat	14.5%	103.5%	4.8%
Poultry	14.5%	113.8%	0.0%
Fish	15.4%	74.1%	53.4%
Eggs	13.6%	100.0%	0.0%

Food Supply Gap is (Dietary Requirements/Food Supply) - 1, expressed in %

Self-suffciency equals 1-(Net Imports / Food Supply), expressed in %

Import Contribution is (Gross) Imports/ Food Supply, expressed in %

Sources: McNamara, Ranney, Kantor and Krebs-Smith (1998) for US Food Supply Gap and Abbott (1998) for for calculations using the FAO (1998) Agrostat Database Collection.

Agricultural policy has a producer bias, especially in the US for these products. That policy has raised prices to protect farmer incomes, and may have discouraged to a limited extent consumption. With large marketing margins and low price and income elasticities for these products, the demand effects of policy are likely to be small, while domestic supplies may well have been increased due to protection (Kinsey). Trade policy has reinforced producer support. Import quotas on dairy remain today, while non-tariff barriers for fruits and vegetables (grades and standards applied to imports) have been used to limit imports as well as meet food safety requirements. Moreover, U.S. agricultural trade policy has promoted exports to dispose of surplus production. The dairy export incentive program (DEIP) continues to subsidize exports even after the 1994 GATT agreement. GSM -102 credit guarantees are used to help exporters of most agricultural commodities. The Foreign Agricultural Service (FAS) acts as an export promotion entity, as viewing their web page will quickly show.

The combination of costly transportation and protection of domestic agricultural producers at one point limited trade, but changes in these and other factors have recently encouraged much more trade in higher value agricultural goods.

Why trade may play a greater role in the future?

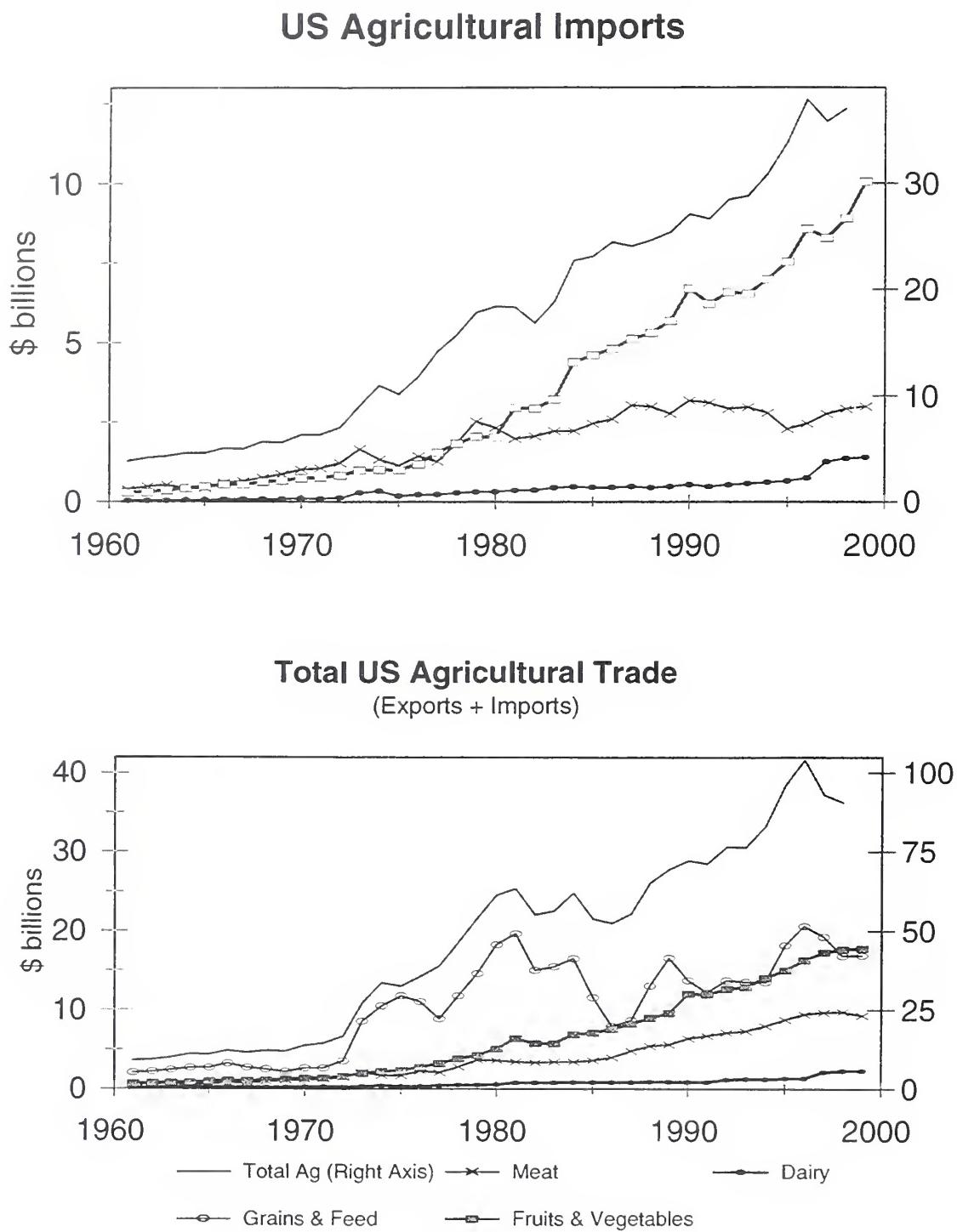
Fruits and vegetables are among the most rapidly growing agricultural imports, as shown in Figure 2. In addition, exports of these products are growing rapidly as well, with growth taking off around 1986. Lack of dynamics in dairy trade until 1995 reflect import quotas which fix trade levels, and which were finally relaxed as part of the 1994 Uruguay Round Agreement. Trends in high value and processed food trade have been recognized for quite a while, and several reasons have been put forward to explain these trends (Henderson, Handy and Neff).

Improvements in transportation have been important to these trends (Trypus). Containerization has greatly facilitated shipment of perishable commodities, and smaller lots of goods. Accurate climate control inside containers preserves quality and shelf life of foods, enabling shipments via less expensive sea freight of goods which previously had to use expensive air freight. Regularly scheduled shipping and modern port handling equipment have improved logistics greatly. Processing has been used to facilitate transportation, as well, and technical change has found better ways of processing perishable goods for transport and storage. Information now moves more easily, as well. Each of these has lowered the cost of transportation, especially for higher value and processed agricultural products.

Numerous agricultural policy reforms have reduced (if not eliminated) the producer bias of agricultural policy. Policy reforms in 1992 and 1996 Farm bills decoupled producer income support from prices, taking away disincentives to consumption and incentives to overproduce (Stovall and Hathaway; Young and Wescott). This was reinforced by the US position and its offer in the 1994 Uruguay Round GATT Agreement, which also emphasized decoupling of producer support from price incentives and reduction of export subsidies. Dairy price supports are being phased out by 1999, and dairy export subsidies are to decline, while new export subsidies for the other products are not permitted. Another initiative of the World Trade Organization, the international entity created to administer the GATT agreement, is to establish harmonized grades, standards and rules governing agricultural trade, and basing those standards more on scientific principles (Roberts). Thus, these regulations will be less likely to be used as protectionist devices limiting fruit and vegetable trade, and more as devices to preserve food safety (Unnevehr, Kramer and Deaton). A similar initiative succeeded in NAFTA, reducing non-tariff barriers in agricultural trade with Canada and Mexico (Raney and Shagam).

While certainly there have been other reasons behind the growth in high value and processed food trade, including greater ease in sharing market information internationally, the reforms of policy and technical improvements of transportation have reduced principle factors limiting trade in fruits, vegetables and dairy products. Recent trends have already shown consequences of these changes.

Figure 2. US Agricultural Trade Composition.



Source: Economic Research Service data.

Potential for increased exports

Another reason why trade is likely to be critical to the evolution of American agriculture, should dietary preferences change, is that there now exist a number of exporting countries with the potential to supply the US market who are aggressively seeking larger market shares. Table 2 shows that countries in Latin America and the Mediterranean often have producer prices for fruits and vegetables at or below levels found in the US. This can be used a crude test of comparative advantage -- where producer prices and hence production costs are lower, freer trade should allow these countries to expand exports. Those countries with producer prices below or near US levels may well be able to cost effectively sell to the US market.

Several of these countries, especially in the Mediterranean, had advantageous entry into the European Union due to Lome Convention concessions which were lost following the recent GATT agreement. As exporters (similar to the US), their policy has also encouraged surpluses, and exports now more than before are needed to dispose of those surpluses.

Will Improving US Diets Create Problems for Food Supplies Elsewhere?

Table 1 is reproduced below as Table 3 using data for world supply and utilization of agricultural commodities. The world food gaps are found simply by scaling the U.S. food requirements upward by the ratio of world population to US population. This exercise shows much greater world food supply gaps, and deficits for most commodities, than in the US case. This suggests larger, though different, nutritional problems outside the US, and begs the question whether using trade to improve US nutritional standing will make the rest of the world worse off. This exercise also provides an opportunity to consider the capacity of world agriculture to meet increased demand.

Three caveats must be borne in mind before addressing the adequacy of world food supplies to meet these nutritional requirements. First, the dominant policy concern over most of the last three decades has been surplus disposal, not inadequacy of supply. Only twice have capacity concerns risen to the head of the debate -- during the 1973 world food crisis and with the price run-up in 1995-96 -- and in each case those concerns received less attention once surpluses reemerged. Second, nutritional standards may reflect high U.S. calorie consumption, cultural biases, and lack of balance in US diets rather than nutritional deficiencies -- especially in the case of meat. Thus, world food gaps reported here may well overstate the problem. Third, nutritional need does not determine demand. Effective demand occurs when consumers need something and have the income to choose it. In spite of poverty and malnutrition, effective demand for food has often been inadequate to maintain prices of agricultural commodities, and so does not provide incentives for increased production. Rather, surpluses have emerged as production has outstripped effective consumer demand.

Table 2. Vegetable, Fruit and Dairy Producer Prices in 1994 Relative to U.S. Producer Prices

Country	CABBAGE	TOMATO PEPPERS	GR BEAN	CARROT	ORANGE	APPLE	PEACH	GRAPE	MELON	MILK
USA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CANADA	0.77	0.88	1.06	0.48	0.58	1.06	1.69	1.04	0.66	1.41
Latin America										
MEXICO	0.53	1.34	0.99	0.43	0.62	0.39	0.89	1.60	0.63	0.68
CHILE	0.87	2.13	0.71	0.71	0.64	1.25	0.57	0.75	0.87	0.79
North Africa & Middle East										
ISRAEL	0.97	1.27	0.76	0.44	0.96	0.98	2.58	1.92	1.34	1.11
MOROCCO	0.95	0.71	0.86	0.61	0.67	0.99	1.72	3.01	1.56	1.38
TUNISIA	0.91	0.44	0.23	0.14	0.17	0.67	2.03	1.77	1.91	1.04
EGYPT	0.26	0.99	0.17	0.14	0.17	0.99	0.73	0.65	0.53	0.41
Europe										
SPAIN	1.19	2.03	1.29	1.71	0.81	1.43	1.08	1.67	1.57	1.10
NETHERLANDS	2.77	8.49	3.64	1.12	1.61	3.27	9.06	11.64	5.30	2.00
FRANCE	0.91	5.70	1.58	3.05	1.32	3.52	2.00	3.71	4.26	3.75
Asia										
JAPAN	3.86	16.53	4.85	6.90	6.50	12.80	8.01	13.67	25.03	11.17
CHINA	0.17	0.31	0.10	0.17	0.23	1.09	0.80	0.61	0.71	0.23
INDONESIA	0.44	0.89	1.68	0.21	0.62	4.74				0.47
THAILAND	0.87	1.70		0.47		4.02			2.83	0.90
NEW ZEALAND							8.20	1.34	3.07	1.22
										0.67

Entries are local producer prices, converted to US dollars, and divided by US producer prices.

Sources: FAO (1998), Agrostat Database Collection, for producer prices in local currency

IMF (1997), International Financial Statistics, for exchange rates.

Table 3. Contribution of International Trade Toward Filling the World Food Supply Gap

World	Food Supply Gap	Self - Sufficiency	Import Contribution
Grains	-19.2%	72.7%	27.3%
Vegetables		93.5%	6.5%
Potatoes	-19.2%	90.6%	9.4%
Others	-19.2%	95.0%	5.0%
Fruit		79.9%	20.1%
Citrus	-19.2%	66.3%	33.7%
Other fruit	-19.2%	83.5%	16.5%
Dairy	-19.2%	84.9%	15.1%
Meat	-19.2%	90.8%	9.2%
Poultry	-19.2%	91.4%	8.6%
Fish	-19.2%	50.8%	49.2%
Eggs	-19.2%	97.5%	2.5%

Food Supply Gap is (Dietary Requirements/Food Supply) - 1, expressed in %

Self-suffciency equals 1-(Net Imports / Food Supply), expressed in %

Import Contribution is (Gross) Imports/ Food Supply, expressed in %

World Food Supply Gap is based on US dietary requirements and World to US Population

Sources: McNamara, Ranney, Kantor and Krebs-Smith (1998) for US Food Suppy Gap
and Abbott (1998) for for calculations using the FAO (1998) Agrostat Database Collection.

While studies have not focused specifically on the world's capacity to produce the foods in deficit in the US diet, several studies have examined the overall capacity of world agriculture to feed an increasing population. While extreme claims exist, the studies by USDA, FAO, the World Bank, and in the International Food Policy Research Institute's Vision 20/20 project can all be classified as cautiously optimistic (WAOB; Alexandratos; Mitchell and Ingco; Islam). They suggest that world agriculture can keep up with demand, provided that sufficient investments, including efforts in research and development, are made. They do raise the concern that the surplus mentality which has persisted since 1986, along with the low prices which accompanied it, have discouraged investments, especially in research, accounting for slowing in agricultural production relative to population. Price incentives are seen as key to insuring adequate incentives to farmers and agribusiness, and to insuring sufficient food supplies in the future.

Another factor relevant to this paper's objectives is that US imports, and its food supply gaps, are only a small fraction of worldwide supplies. Increased imports would not unduly strain the production capacity of the world to meet increased demand, though prices would need to rise to redirect product to our market.

Lessons from the 1973 food crisis, and from famine management support a similar position (Islam and Thomas). As noted above, the coexistence of famine and food surpluses is explained by the importance of effective demand, not supply capacity, in determining what people eat. Increasing supply capacity but not demand will only add disincentives to future production growth. As in the other arguments here, demand levels are key to the evolution of markets and their ability to provide healthier diets.

How world food markets now function - Implications of Two-way trade

An important characteristic of the rapidly growing vegetable, fruit and dairy trade is that it is two-way -- imports and exports coexist. Why this occurs, and its implications for future trade outcomes, is best seen by an example.

Tomato juice served on Royal Air Maroc, the state owned airline of Morocco, on flights to France, is processed in California from tomatoes grown there. Several aspects of this "trade flow" make it remarkable. First, tomatoes have been historically exported from Morocco to France, but Spain's position in the EU, and recent policy reforms required under GATT have given the advantage to Spain in the French market. A long standing policy dispute continues over Moroccan access to the EU as a result, since France has remained Morocco's primary export destination, and it has experienced only limited success in penetrating other EU markets. In spite of this dispute, Morocco is "exporting" tomatoes to France as juice in this example, but with tomatoes which are not of Moroccan origin. This, in turn, is in spite of the Moroccan efforts, to some extent successful, to sell processed tomato products in the US market. This effective "US export" is of a product in which we are experiencing a nutritional deficit according to the food gap analysis, while some of the good (tomatoes) is being imported.

Several lessons are apparent from this example, especially if one considers why the US tomato juice processor may have succeeded in this market. First, tomato juice is not a common product in either French or Moroccan diets - the product is an innovation. Second, for the airline, the convenience provided by the packaging (the can) is of greater importance, and may well have cost more than the tomatoes inside. The processor was marketing a differentiated product (juice), and importantly, service embodied with the product (the can, and timely deliveries to the airline). Successful marketing by the processor enabled the US to profitably export a product where a food gap existed. Processing, including packaging to facilitate transportation, both differentiated and increased the value of that export, and facilitated transportation. The driving force for this transaction was the "consumer" demand by the airline -- not only for tomatoes, but also for a particular product and service -- and the marketing strategy of the juice processor, who succeeded in the face of an opposing policy environment and an apparent comparative disadvantage.

This example of a US firm targeting an exporting country as a market for a differentiated product, resulting in profitable two-way trade, is a concrete example of New Trade Theory, and

goes a ways toward explaining the differing perspectives of comparative advantage and competitiveness.

Competitiveness and Two way Trade

According to the theory of comparative advantage, low cost producers will export those products where costs and prices in the absence of trade (autarky) and below free trade world prices. Factor endowments and technical differences can bestow this comparative advantage on a country. Several characteristics of modern trade patterns contradict the predictions and implications of this theory (Either), and may enable a seemingly higher cost producer to win in a market. Two-way trade is one important contradiction. I view the important difference between comparative advantage and competitiveness as arising as a consequence of the elements found critical to the New Trade Theory, and which explain these contradictions - economies of scale, product differentiation, and imperfect competition (Abbott, 1998).

In the above example, product differentiation is a key factor determining success of an exporter strategy, and leading to observed trade flows. Marketing and distribution are seen, especially for higher value agricultural products, as important to determining profitable trade outcomes. Transactions costs (transportation and marketing margins) and institutions (airline food service as the source of demand) are as critical to how markets will evolve. Food manufacturers will respond to consumer demand in the context of these constraints and opportunities. Better diets will be provided only if consumer preferences make providing healthier diets one of the driving forces behind those opportunities.

Conclusions

Consumer demand, not production potential, is key to how food markets will evolve and whether there are improvements in U.S. diets. In virtually all of the perspectives presented above, it was seen that demand trends drive production, not vice versa. Consumer preferences and education will determine that demand. Supply adjustments may not be immediate, and price increase will lead supply adjustments, but production in both the U.S. and abroad can accommodate the needs projected in U.S. food supply gaps. International trade will determine how adjustments occur, even for the key products in deficit - vegetables, fruits and dairy.

Transportation system improvements and policy reform will make contribution of international trade toward this goal easier than in past. Technical improvements in international shipments of food products have reduced costs and logistical barriers to trade in the key products identified here. Policy reforms in the 1991 and 1996 farm bills, and in the 1994 GATT Agreement as well as NAFTA, have reduced the producer biases of agricultural policy which worked against trade contributing to food supplies in these cases. Rapidly increasing processed food and higher value agricultural product trade indicate this change agricultural trade composition is already underway.

US agricultural production, food manufacturers, and international trade can provide the variety and service consumers demand. Price incentives and marketing strategy of processors and distributors matter to what portion of increased demand may be seen by American farmers, and

whether healthier diets will in fact arise in the future. Policy is at greater risk of being a deterrent to, rather than a stimulus to this process, which will be largely market determined.

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Endnotes

1. The Proceedings of the conference "Toward Convergence on the Dietary Guidelines: Research and Policy Needs" sponsored by the Economic Research Service of USDA, the National Cancer Institute, the Farm Foundation and Cornell University, held on October 13 -14, 1998 in Washington, DC. Will appear in the April 1999 issue of Food Policy. See Abbott as well as several other cited papers for a fuller discussion of issues raised here.

EXPANDING WIC FARMER'S MARKETS

Michael Tabor
Farmer, Licking Creek Bend Farm, Needmore, PA

Stated simply, the WIC Farmer's Market Nutrition Program (FMNP) has been the best form of Federal and State help since I started farming some 24 years ago. What it does for me as a grower of fruits and vegetables is to bring large numbers of customers at a time (August) when I'm at the peak of production but many of my regular customers are on vacation. During that period, over a third of my customers are WIC FMNP recipients. And I'm very happy to have them at my market.

For those of you who are not familiar with the program, FMNP provides \$20 worth of coupons to WIC recipients in approved states, to buy fresh produce from over 9,000 farmers across the country. In FY 1999, FMNP advocates are expecting \$15 million to be available for the program (along with 30% matching requirements for states). However, no nutrition program should be seen as part of a piecemeal approach to the greater nutrition issues facing inner city (and suburban) children today. I feel the program should be included in the larger issues of nutrition and health concerns confronting this community. So, it should examine connections with schools and general attitudes about food and eating. This conference is an ideal forum in which to raise these issues - especially if we're looking at expanding the program (something which I, as a farmer, heartily endorse!)

What I find at the Maryland and Washington D.C. area markets I sell at is a growing disinterest among inner-city customers for fresh fruits and vegetables. We need to change this attitude. What many kids tell me, when I go to speak at their schools is that their typical breakfast is candy bars, cake or sodas, rather than a nutritious school breakfast. Lunches in some cafeterias are fast food imitations... chicken, pork and fish "nuggets", pizza or hamburgers. Salads and fruits, although they are offered, are often not eaten .

Although it's no longer permissible for tobacco and alcohol products to be peddled to teens, the fast food industry bombards American children on buses, TV, movies radios and in the schools. The messages tell children that a diet rich in high cholesterol burgers, caffeine and sugar-laden soft drinks, candies, deep fried snacks, are all desirable and even cool. Some parents succumb to the pressures and give their children what they are conditioned to want to eat.

We need to send out a different message. We need to make eating a nutritious lunch at home and at school...cool!

But it's not hard to understand why many parents have little idea about what to do with fresh mustard, collard, spinach and broccoli, except to perhaps overcook them and add fatty meat

by-products. Or, why bother to cook in the first place, since the kids seem to eat mostly what comes out of the freezer or a can?

So, what to do to change WIC FMNP participants perception of a healthy diet? Here are some of my thoughts:

1. Undertake a national public education campaign coordinated with farm organizations, nutrition and health groups and USDA, aimed at showcasing fresh fruits and vegetables. Produce pro-bono ads showing Michael Jordan munching on a tomato, Celine Dion eating grapes, Madonna eating pears - all putting out the message that vegetables and fruits are sensuous, cool, and oh, even healthy!
2. At the local level, stress the use of positive male and female role models who eat healthily - teachers, coaches, sports figures, broadcasters, well-known professionals (from various local ethnic population, with whom young mothers, and children can identify).
3. That school cafeterias be showcases of healthy, tasty and nutritious local vegetables and fruits and whole grain breads, using ethnic recipes that emphasize fresh produce, and hire workers from WIC recipients as chefs and workers whenever possible. Perhaps even some of the students could participate in the preparation of the meals (in connection with school nutrition classes) and bring recipes from home. Students could be challenged to help prepare healthy, good tasting dishes which conform to the USDA food pyramid.
4. Prohibit in the schools vending machines filled with caffeine, sugar-laden (or sugar substitute) sodas, candies and snacks. Request that major vending companies offer products made with whole fruits (not 10% imported concentrates), and cold, natural, herbal teas mixed with fruit juices, lines of tasty frozen fruit sorbets on a stick (much like that available in Central and South America). Or, invite fruit farmers into the schools and during events to sell their products, along with apples, grapes and orange juices. (This could be combined with youth entrepreneurship whenever possible.)
5. That schools and government cafeterias be allowed to purchase food from local farmers - providing fresh, nutritious vegetables and salads. And that whenever possible, children be allowed to visit, participate in the harvest, and perhaps even glean donated vegetables and fruits for food banks and soup kitchens.
6. Encourage youth entrepreneurship projects as part of the program. For example, involve inner city youth with gardens, farmers, and the production

of food such as applesauce, salad dressing, salsa, pesto. (Example, "Food from the Hood"). Any positive youth connection with local sources of fruit and vegetables is a positive step.

7. That farmers who are recipients of WIC FMNP coupons be asked to volunteer a few hours during the winter season in inner-city schools in a co-ordinated program aimed at giving the kids a better understanding of the "bio-region"; promoting an awareness of the traditional relationship that once existed between the rural areas that surround cities.
8. Organize health and food fairs where WIC FMNP coupons are distributed (thereby encouraging attendance). At the fairs, gourmet chefs and FMNP representatives could demonstrate what the regional produce is and how to prepare them. Booths for diabetes, high blood pressure, heart disease and cancer screenings could raise the level of awareness of health issues connected to bad diets. Ethnic cooking demonstrations could show alternatives to frying (roasting, broiling, baking and boiling). And local farmers could participate, meet their potential customers and customers could learn and taste what the farmers grow.
9. And, most importantly, combine, on the federal and local levels, a multi-agency approach using the resources of labor, education, agriculture and health agencies, whenever attempting to reach out to the WIC eligible population. With the eventual goal of getting them off WIC and other programs. And, at the same time, establishing better eating patterns.

Again, I want to emphasize that this WIC Farmer's Market program is the best thing that has come down the pike for vegetable and fruit farmers who sell their produce at direct markets. Personally, I would like to see the \$20 million FMNP request for FY2000 increased and included in a broader package aimed at encouraging a change in eating habits among our general population of school children and young mothers. If not, I believe we'll see higher future costs for health, hospitals and social security needs as this population ages. But, as an outsider to the bureaucratic process, I can only hope that the program becomes part of that larger strategy, coordinated with other agencies, and the private sector, aimed at doing what's in our best interest - helping the next generation to be healthy, alert, positive contributors for the future of our communities and nation.

Thank you.



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